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MARCH

1954

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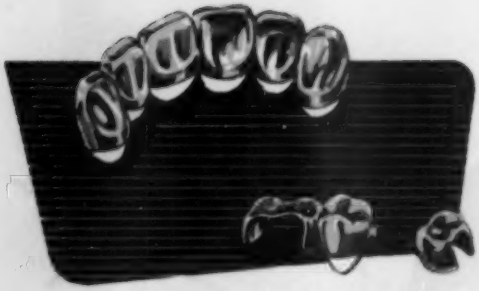

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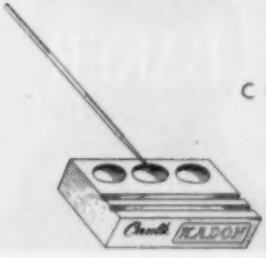

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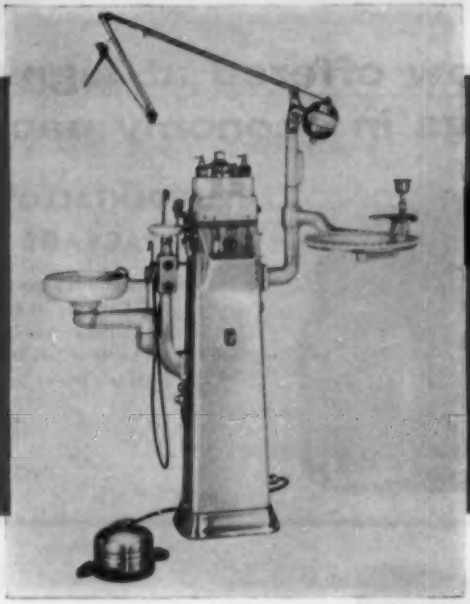

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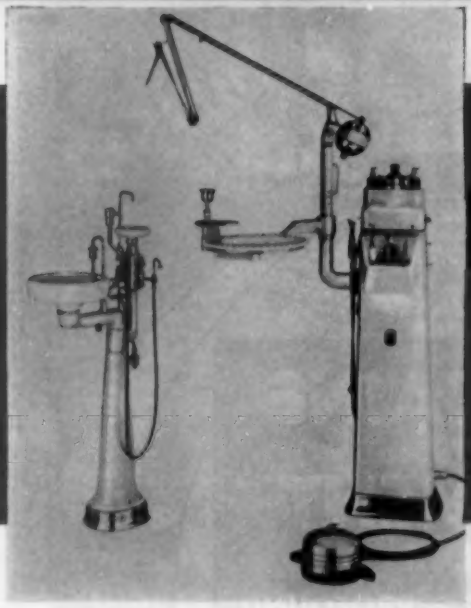

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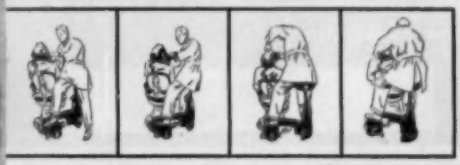

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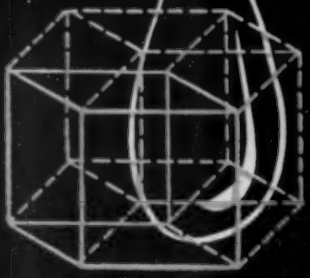

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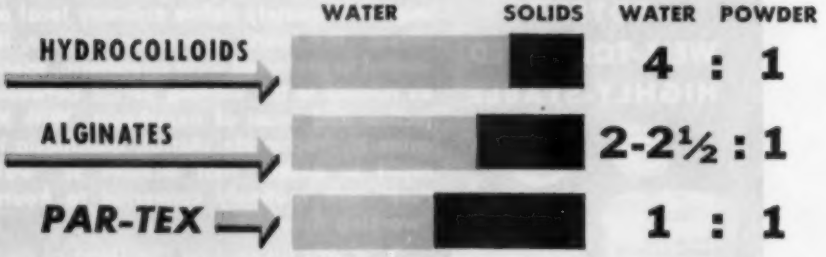

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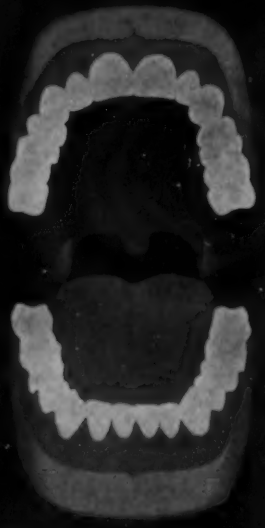

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MARCH 1954 VOLUME 48 • NUMBER 3

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Public dental service in Norway

Knut Gard, Oslo, Norway

Public dental service in Norway consists of dental treatment provided for the people, free or on a fee basis, under a program initiated by the government, maintained under public supervision and regulated by law. This service is available to all classes of society, regardless of economic position, within the groups of the population which have been specified by law or by decree of responsible authorities.

To understand the present status of the Norwegian public dental service, it is necessary to know something of its background and development. In Norway dental professional organizations have existed since 1866, when the Scandinavian Dental Association, composed of members of five neighboring countries, was founded. This association has played an important part in the development of public dental service in the Nordic countries. The dental health service in Norway developed largely as a result of the efforts of the dental professional groups.

As early as the 1880's, dentists throughout the world were aware of the rapid increase in dental disease and realized that something had to be done to provide help for every stratum of the population. The first effort was directed to the compilation of statistics regarding the dental condition of school children and also of soldiers. The facts ascertained were alarming.

At the Madrid Dental Session in 1903 and at the St. Louis International Dental Congress in 1904, resolutions in regard to dental health service were passed; but these dealt only with the dental health of soldiers. At the Fifth International Dental Congress held in Berlin in 1909, the following resolution was adopted:

Presented before the Section on Public Health Dentistry, ninety-fourth annual session, American Dental Association, Cleveland, September 28, 1953.

Secretary General, Norwegian Dental Association.

"The establishment of municipal dental hospitals for children is an international necessity today and in the interest of public health."[1]

In Norway at about the turn of the century, social groups were formed whose purpose was to organize and to maintain national dental care, that is, dental treatment for persons without means in all age groups. The first result was the establishment in 1910 of the first two school dental clinics in the capital and in the next largest town. In the next few years, school dental clinics were established in several municipalities.

At the same time national health insurance was introduced. Immediately it was proposed that health insurance clinics should have a permanent dentist and that these clinics should receive financial support from dentists in private practice for prophylactic treatments.

The Norwegian Dental Association worked actively for school dental care in 1917. The Norwegian national assembly, adopting the line taken by the Association, passed an Act authorizing state support for school dental care. The Act stipulated that all urban communities should introduce dental care before 1927. This Act attracted justifiable attention abroad, because the Norwegian assembly was the first national assembly in the world to introduce school dental care by law and to grant it a state subsidy.

In 1918 when the first World War ended, the program of school dental care was suspended, at first because of the lack of dentists and later because of the difficult local, national and world conditions. The result was that the *Storting* (Parliament) extended to 1937 the time limit for the introduction of free dental treatment for school children in towns. At this time the Parliament proposed that dental care should be free for everyone. The time limit as finally determined was 1942. There is no law making school dental care compulsory in the rural districts. Some districts are too small for the program to be practical; furthermore, in many rural districts it would be extremely difficult to provide dentists on account of geographical conditions. The Parliament does supply an incentive for the program, however, by making the state subsidy for the rural districts twice as large as that for towns. At present the state assistance in towns amounts to one eighth and in the country to one fourth of the total salary expenditure.

It was to this point that school dental care had developed before World War II. Since the war, work has been speeded up again, and today more than 80 per cent of the school children in Norway receive free dental care. This record is probably the best of its kind in the world today.

In Norway since the war, a law, based directly on the regulations for the primary (folk) schools, has been passed extending the program to the secondary continuation schools for one or two years. The free dental care provided for the children attending these schools is in accordance with the rules laid down for the folk schools.

At present organized school dental care is provided in all towns in the country and is being introduced constantly in additional rural districts. The school dental care program has been so systematized that it begins with the first class and continues thereafter. On this point there has been much discussion in some municipalities where it has been advocated frequently that dental care should be provided only for children who are about to leave school; but the plan of systematic dental care from the beginning of school life has now triumphed everywhere.

At first, school dental care was provided in offices off the school grounds. The Norwegian Dental Association,

1. Resolution, Verhandlungen des V internationalen zahnärztlichen Kongresses, vol. 2, 1909, p. 567.

however, recommended early that offices should be set up on school premises wherever it was practical. This view has now prevailed in most places.

Besides these permanent clinics, there are also traveling clinics. The latter have simpler equipment, transportable by car, arranged to be set up quickly in the smaller schools of the country districts and to be used only for the time required to treat the school children. In many of the smaller *kommunes* (districts), treatment is given at the dentist's private office; in such cases, a schedule of treatment is planned in advance, and frequently travel is arranged by boat or by bus for the trip to the private dentist.

At other places the district has opened a special office, in spite of the fact that the number of children is often too small to permit the appointment of a full-time dentist. The dentist engaged may use the community office for private practice as well as for school dental care.

Of the approximately 1,900 practicing dentists in Norway, some 500 are engaged in school dental care. Fewer than 200 have full-time appointments; the remainder work part time either in their own offices or in community offices. The dentists who are employed full time receive a fixed annual salary. Those working part time also may receive a fixed annual salary, but the majority are paid by the hour or by the number of children. When they work in their own offices, dentists receive a rate per hour which covers all expenses of the treatment. The fee per child likewise covers all expenses.

When school dental care was first established in Norway, some objection to the scheme on the part of the dental profession was encountered. This opposition, however, has gradually disappeared; today dentists support school dental care 100 per cent. There are several reasons for this change in attitude. In the first place, in Norway, as in other countries, many private practitioners prefer not to treat children. A second and even more practical reason is that experience has shown the private practitioners that school dental care increases the number of patients. By reason of the routine school dental care, children become accustomed to visiting a dentist; consequently, it is altogether natural that a large percentage of the children should continue visiting the private dentist when they finish school and have become adults. Furthermore, their teeth are well cared for, so that in general it is a pleasure for a dentist to have a patient who has received school dental care.

An interesting aspect of the school dental care program is the number of women who are employed as school dentists. About 25 per cent of the dentists in Norway are women, and a large proportion of them are employed in school dental care. Naturally, these women dentists are particularly capable of caring for children; they are, furthermore, conscientious and patient and do excellent work. For one reason or another, school dental care is an employment admirably suited to women; the work periods correspond to the school day and to the school year. The school dentists work six hours in the morning during school hours, and they are free at the end of the school day. They work a 38 to 40 hour week per year with office hours from 8 A.M. to 2 P.M. or from 9 A.M. to 3 P.M. Since most of the women dentists are married, it is a convenient arrangement for them. They are at work when their own children are in school and off-duty at the same time that their children are out of school.

The majority of the male school dentists likewise have devoted themselves to the work because of their interest in school dental care. As a result, the level of school dental care in Norway is exceptionally high.

Though the State pays part of the salary expense of school dental care, the separate districts pay the principal part

of the working expenses. The counties also contribute, but their contributions are not fixed by law.

One of the weaknesses of the school dental care program is that its direction is too decentralized and the work controlled too little. Under the law, it is the individual district that establishes and administers the program, usually with a board consisting of representatives from different political parties.

In the smaller districts in particular, school dental care has been promoted by various health organizations which have made contributions to the district so that the district could start the program. These health organizations have done excellent work and have contributed generously. It is frequently their members who appear on the school dental care boards.

In some of the counties dentists have been appointed as inspectors, and the counties have stipulated as a condition of their contribution that the inspector shall have the right to control the program.

The State exercises no control over the program. For several years partial control was exercised by a dentist appointed to a minor auxiliary post in order to check the reports from the school dental clinics. Until 1945, this control, with a few exceptions, consisted merely of calculating the state subsidy on the basis of the reports. Since 1945 there has been a separate dental office in the Directorate of Health, which is under the Ministry for Social Affairs. The head of this office is a dentist; it is now his responsibility to calculate the state subsidies. Control has been somewhat improved under this arrangement; but, nevertheless, there is still little actual control over school dental care.

The dental school care program has shown progress, especially since World War II (Table 1). Whereas in 1937-38 only 33.9 per cent of the school children were treated, 80.5 per cent were treated in 1950-51. In 1937-38, 4.08 fillings were provided per child; immediately before the war, in 1939-40, this figure fell to 3.61 and during the years of occupation even lower; in 1945-46 there were only 1.78 fillings per child. In 1950-51 the figure rose again to 3.26 fillings per child.

During the Occupation, from 1940 to 1945, for a long time food rations in the country were very small, and nutritional-hygienic conditions were poor. Although this situation was a source of anxiety in many respects, at the same time the incidence of caries fell to half; it rose again rapidly as soon as the Occupation was over and rationing gradually ceased.

In regard to permanent teeth extracted, there are reliable figures only for the years after the war, since the statistics before the war include both deciduous and permanent teeth. Only 0.07 permanent tooth per child was extracted in 1945-46 compared with 0.06 in 1950-51; at the same time the number of root fillings per child in 1937-38 was 0.03 filling compared with 0.009 in 1950-51.

The Norwegian Dental Association realized very early that school dental care alone would not solve the dental problem for all children and youths. It was, however, a practical approach to the problem, since it is easy to reach school children both for control and for treatment.

A few years after school dental care had been started in Norway, some of the districts, on advice from dental quarters, set up a program of dental care for small children and for youths. At first as a rule children were treated at the school dental clinics the year before they commenced school and the year after they finished school.

At the beginning of the 1930's, a committee was appointed in Oslo consisting of members from the various political parties who were to examine the question of municipal dental clinics for the treat-

ment of the people of the towns. The committee which cooperated with the dental profession was opposed to the opening of clinics for adults before a systematic treatment of everyone between 3 and 21 years had been carried out. For economic reasons, among others, the committee in its final recommendations set the age limit at 18 years. The chairman of this committee was Birger Bergersen, then professor of anatomy at the Norwegian Dental High School, now Norwegian ambassador to Sweden.

The plan was launched in 1938; and a program for the dental care of small children and youths was set up systematically just as the school dental care program had been set up earlier. The first year the children 3 years old and the youths 15 years old were given the opportunity for treatment. In the course of five years, the organization was completed, and since then systematic treatment has been provided for anyone between 3 and 18 years of age who desired it.

The treatment of small children and youths is purely a municipal affair for which no state subsidy is provided. An annual sum, originally 3 kroner, now 5 kroner, is paid per small child, and 10 kroner, originally 5 kroner, for youths; but all persons finding it difficult to pay this small sum receive free treatment.

The municipality planned originally that the dental care for small children, school children and youths should come under the same administration; but during the building up of the service, dental care for small children and for youths came to be administered separately.

Public dental treatment in Oslo is now the function of an independent administration called Oslo Municipal Dental Service. It comes under the administration of the town in the same way as the Public Health Service and Town Planning.

About 1930 the Norwegian Dental Association's local society in Oslo, the Oslo Dental Society, organized a dentist's first-aid office to be kept open during the evenings and holidays. The dentists working there were employed by the Oslo Society, and private dentists in Oslo could refer their patients to the office on evenings and holidays if pain occurred on account of treatment. In 1940 the Oslo society presented this clinic to the Municipality of Oslo, and thereafter it came under the Oslo Municipal Dental Service.

Table 1 • Dental school care in Norway

	Children treated	Fillings per child	Extracted perm. teeth per child	Root treatments per child
	%			
1937-38	33.9	4.08	—	0.03
1939-40	42.5	3.61	—	0.02
1945-46	63.6	1.78	0.07	0.005
1950-51	80.5	3.26	0.06	0.009

There is also a national health insurance plan in Norway, which was started in 1911. Membership is compulsory for all wage earners; other individuals can be voluntary members; today more than 90 per cent of the population are members. In 1943, when 18 year old youths in Oslo first received treatment under the program, the health insurance authorities in Oslo decided to grant compensation to all members up to 18 years of age who had received regular dental treatment. One may say that, in principle, they receive compensation for preservative treatment and that this compensation is about two thirds of the usual fee. Patients may select their own dentists, who charge their usual fees for treatment. The arrangement works out well and is popular both with patients and with private dentists. In 1952 about 8,000 youths in Oslo were compensated for dental treatment. Originally, compensation continued until the twenty-third year, but the age has now been lowered to 21 years.

Thus, the Oslo plan today provides treatment for everyone from 3 to 21

Table 2 • Dental school care in Oslo 1951-52

Age group	Children treated	Filled surfaces		Enamel cement	Root treatments	Extractions	
		Amalgam	Copper amalgam			Temp.	Perm.
3-6	19,584	82,673	50,833		1,619	1,461	1
7-13	29,262	132,646	9,949	749	284	12,139	296
14-18	10,203	81,957	473	8,252	221	119	85
Total	59,049						

years. For children and youths from 3 to 7 years and from 14 to 18 years, a small annual sum is paid for services whereas for children from 7 to 14 years treatment is free under law. For youths from 18 to 21 years compensation is granted amounting to about two thirds of the fees of the dentist, freely chosen. An example of one of the results of the system is that in 1950 when members of the health insurance plan in Oslo still received compensation up to 23 years, not a single partial prosthesis was made for any patient who applied for treatment under the Oslo plan. At the present time, about 70,000 receive treatment under this plan, that is, between a sixth and a seventh of the population of the city.

In Oslo during the year 1951-52 more than 19,000 small children were treated (Table 2). In this group only one permanent tooth was extracted; but this group had, of course, mainly deciduous teeth. In the group 7 to 14 years of age nearly 30,000 were treated. Only 284 root treatments, all of deciduous teeth, were given; and 296 permanent teeth were extracted. In the group from 14 to 18 years, more than 10,000 were treated. In this group, 221 root treatments were given, and only 85 permanent teeth were extracted.

A plan similar to the one in Oslo has of late years been introduced in other municipalities, and other local health insurance offices also grant compensation for youths when they no longer receive community dental care. Such projects, however, are scattered; they are dependent on the interest of the municipality concerned and on the local economy.

In the years since the opening of the first dental school clinics in Norway, the Norwegian Dental Association has worked for the extension of public dental care beyond school dental care. At the general meeting in the autumn of 1945, the first such meeting held after five years of occupation when the organization was in Nazi control and members resigned, the general meeting passed the following unanimous resolution requesting that the government should "establish a governmental committee to examine the question of public dentistry in Norway."

The committee, which consisted of dentists, physicians and representatives of the various political parties and which had a dentist as chairman, was appointed by the government in 1946 and presented its recommendations in 1947. The report was forwarded by the Ministry for Social Affairs for recommendations to a number of institutions including the Dental Association. In 1949 a proposed law in regard to national dental care was submitted to the Parliament and passed unanimously; the Act became law July 1, 1950. Some of the provisions are of particular interest.

National dental care consists primarily of the treatment of children and youths from 6 to 18 years. The Committee proposed that it should include children and youths from 7 to 18 years and had recommended that small children 3 to 7 years also should be included. A change

had to be made for financial reasons, and the Committee decided that it was more important to include youths than small children. The Norwegian Dental Association stated that both small children and youths should be included, and the result, as already mentioned, was that the Ministry and the Parliament in the main followed the Committee's recommendation. It was decided that children between 6 and 7 years of age should receive free treatment in order that the first permanent molars could be treated at the most favorable period possible. During the discussion in the Parliament a further amendment affecting small children was made. The law declares that the King with the approval of the Parliament may decide that the nonpaying clientele shall include also small children from 3 to 6 years in the whole country or in part of it. Therefore, no amendment to the law is necessary to make it possible for small children also to receive free treatment. One of the greatest difficulties in including small children as a group for free treatment, however, is that an adult must accompany a child visiting a dentist. Outside of the town districts, it may be difficult to make such an arrangement because of the long distances.

The Act provides further that the rest of the population shall receive treatment at fees fixed by the ministry concerned. The Norwegian Dental Association, however, did not approve of this provision but considered—and still considers—that first and foremost the former line of action should be followed and that step by step a systematic plan of treatment for everyone from 3 to 18 years must be established. At the same time, the Association has clearly stated that certain districts suffer particularly from want of dental assistance and that the treatment of adults in these places should be started as soon as possible even if this program would delay the carrying out of the dental care program for children and youths in the districts concerned.

The program for adults might seem to be a socialized plan, but not if there is an understanding of the Committee's preparatory work, on which both the program and the Act itself are based. It is clear to anyone who knows the situation in Norway that the adult population must receive assistance in those districts which are far from a private dentist. It is not sensible that children and youths should be treated until 18 years of age by a dentist living in the locality and that this dentist, who has a public appointment and is the only dentist available, should refuse to treat the same patient as soon as he is 19 years of age. The distance to the nearest private dentist may be as much as 20 Norwegian miles (200 kilometers or about 125 English miles). In such cases it costs money and time to reach the dentist. In a town such as Oslo, however, it should not be necessary to have officially appointed dentists for the treatment of adults. Obviously it would be necessary to distinguish between places where the treatment of the adult population would be free and places where it would not be free, even though in principle a law should apply equally to the entire country.

The Committee has calculated that there should be 20 district dentists in Oslo who in 800 hours per year should be able to treat the adult population. For the remainder of their time these dentists should treat children and youths; in addition, some 35 dentists should treat only children and youths.

Since there are today 500 dentists in private practice in Oslo, it is clear that the Act does not contemplate socialization.

Under the Act, it is the responsibility of the individual county or the individual town to institute national dental care, to provide treatment and to pay expenses. The plan must be approved by the Ministry for Social Affairs, and the King then decides when the county may introduce the service. The latter provision

has been made because there are so many difficulties in connection with the introduction of national dental care. For example, there are too few dentists in the country to enable all counties to start the program within a few years and, moreover, difficulties in regard to the building of offices and houses for dentists are considerable. The counties where there is the greatest need for dentists should be the ones to start programs first. Immediately after the law was passed in 1950, national dental care was introduced in the most northern county of Norway, Finnmark, which was totally devastated when the Germans withdrew in 1944. They had used the scorched earth policy, and the entire population had been forcibly evacuated.

The county of Finnmark is large, 50,900 square kilometers; but the population is only 65,000. Since 1945 the State has worked energetically to build up the county again. Fortunately, there are now twice as many dentists in the county of Finnmark as there were before, and soon all school children and youths will receive systematic dental treatment. The dentists with private practices and the publicly-appointed dentists work together.

It is only this year that the government has given permission for the introduction of national dental care in the next county, Nordland, which extends far north and south and has innumerable inhabited islands. Some 220,000 people live in the districts outside the towns; the area of the county is 39,000 square kilometers. Whereas in Norway today there is one dentist per 1,700 people, in the county of Nordland there is only one per 6,000 people.

As already mentioned, it is the individual county or the individual town that is responsible for financing the program. The district maintains the office and pays the county 5 kroner for each patient receiving free treatment. The State pays 60 per cent of the salaries in rural communities and 30 per cent in urban communities; in response to an application, the State may increase its contribution to 80 per cent of salaries in rural communities and 40 per cent in urban communities. The county or the town receives fees from adults. The expenses that are not covered by these funds must be met by the county or town concerned.

The dentists who serve in national dental care are classified as county dentists or district dentists, Classes A, B or C. The county dentist is the technical and administrative head who directs dental care on behalf of the county. He is appointed by the King and has a responsible position.

The county is divided into districts with a district dentist, Class A, in charge. He works about half-time with children and youths; the rest of his time is devoted to a paying adult clientele. He also is a government official, appointed by the King. In each dental district, according to demand, there are district dentists, Classes B and C. A district dentist, Class B, corresponds to a school dentist in municipal service. When national dental care is adopted by a county or town, the school dentists need only to change title. They continue to treat only a nonpaying clientele. They have the same working hours and holidays, and their salary also is the same. As a rule, pension provisions are somewhat improved.

District dentists, Class C, are dentists in part-time posts. They are appointed according to demand in the particular district concerned, can work up to 900 hours per year, and, according to demand, may treat children, youths and adults. These part-time posts are suitable for dentists who today hold a part-time post in community dental care.

District dentists, Class B and Class C, are appointed by the county or town concerned; the appointment needs only the approval of the Ministry.

In regard to district dentists, Classes

B and C, there are, of course, some problems when a county changes from the public dental care program now in effect in the form of community school dental care to the national dental care program of the State. Because positions such as district dentist, Classes B and C, have been incorporated into the State's national dental care program, the transitional stage is not extremely difficult; moreover, the expenses of the individual district are less under the national dental care program than under the community school dental care program.

The Act regarding national dental care provides also for the appointment of some specialists in orthopedics of the jaw and in dental surgery. It is intended that these specialists will work in centrally located clinics and that they will be appointed as required.

As far as the auxiliary helpers either in community school dental care programs or in national dental care programs are concerned, practically all dentists in Norway employ dental chair assistants.

In time it will become appropriate to include dental mechanics in the national dental care program. In Norway, the dental mechanics are handicraftsmen, trained in accordance with the requirements of the law governing handicrafts. Dental hygienists are seldom employed in Norway. There are a few private dentists who employ them; but, otherwise, they are employed only by the municipal dental care authorities in Oslo. They are trained in much the same manner as in the United States. As a general rule, the Norwegian Dental Association is absolutely opposed to the use in public dental care programs of auxiliary help as now employed in New Zealand.

In reality, in only one sphere is there any provision for centralization in the national dental care program and that is in regard to prophylaxis. It is agreed that in this important and at the same time controversial field the risk cannot be taken that each separate county and town dentist should launch his own particular program with resulting programs possibly in direct opposition one to another.

The Directorate of Health has not yet worked out any prophylactic program, since the Directorate is occupied with the task of instituting the national dental care program in the two first counties; but it has worked out a proposal that is now being discussed by about 20 experts in the odontological, medical and other fields. The proposal deals with such subjects as what foods should and should not be eaten, desirable oral hygiene, and the question whether fluoride should be mixed with drinking water and brushed on the teeth. There is ground for the belief that the first directives regarding prophylaxis will be sent out in the course of the coming autumn.

There are a few other details worthy of special mention. As long as small children are not included as a nonpaying group, they have, under the law, preference in treatment before the adult clientele. Women who are pregnant also have the right of priority.

The State can contribute to municipal dental care of small children and youths in the same manner in which it contributes to school dental care. As yet, unfortunately, such provisions have not been made in the budgets since the Act regarding national dental care came into force in 1950.

National Health Insurance was introduced by law in 1911. All members are covered for the major part of their medical and dental expenses and receive free hospitalization. This provision may apply also to the members' wives and children under 16 years of age.

As far as dental treatment is concerned, the member, his wife and his children receive compensation for what is called surgical treatment. Compensation, therefore, is given, not for conservative and prosthetic treatment, but for surgical

work such as extractions, operations in connection with the removal of cysts and with other jaw troubles, and periodontal treatment. Usually, the amount of compensation is half or more of the fee charged by the private dentist; the patient has free choice of dentist. There are no clinics and no contracts. The rule is that the patient pays his dentist himself and obtains from him a receipt which entitles him to a definite refund from the National Health Insurance office. The expenses of the latter office for dental treatment amount to about 1 per cent of its whole expenditure.

In connection with the school dental care program and even more in connection with the law on national dental care, it is generally agreed that abroad the Norwegian public dental care program is considered to be of the same type as the socialized dental system in England. During the Congress in London last year information was given that 14 million partial dentures were made in England during the years 1948-51, that is, during the first four years of socialization, likewise that during the last nine months of 1951, 9 million teeth were extracted whereas 7 million were treated conservatively. The figures quoted from Norway cannot, of course, be compared directly with the English figures, because the latter apply to the entire population. Nevertheless, the figures are significant; on the basis of these two sets of figures, it may be concluded that in Norway a social plan has been launched which is a satisfactory alternative to socialization.

In the difference lies the crux of the whole matter. When the community and the dental profession see that something must be done to enable a nation to preserve its dental health and when they see at the same time that the average family in Norway has no financial means to preserve the dental health of its members without help, the problem is clear. It becomes a question then whether the dental organization has a social alternative to socialization, whether it feels its responsibility to the public, and whether it is willing to make use of its professional insight and to cooperate in the working out and execution of such a social plan. If the dental organization takes the latter course, the result could and should be a blessing both for the community and the profession. If, on the other hand, the dental profession is opposed to all proposals regarding public efforts, the obvious and natural consequence will be that the community, represented by its politicians, will launch its own plan and that such a plan, for example, a plan of socialization, must of necessity be unsatisfactory.

The aim of the Norwegian dental care law is to preserve the dental health of children and of youths through community aid. Adults in Norway then will attend private dentists of their own choice. The patients whom the private dentists will receive for treatment will have become accustomed from childhood to regular and systematic treatment, and their teeth will have received good care. Furthermore, private dentists will no longer have to deal with child patients, frequently difficult and time-wasting. The fact that the provisions of the law have extended in part to an adult clientele and that the Norwegian Dental Association has not absolutely opposed this inclusion as unnecessary is due to the geographical conditions, a scattered population and the resultant frequently expensive and time-taking journeys to the nearest private dentist.

It is difficult to make a prediction for the future; there are so many factors, especially those relating to economy, which cannot be estimated. Yet a guess may be hazarded:

The law on national dental care will continue. According to the Committee's estimates, about 900 dentists in full-time and part-time public posts will be appointed. Though the law provides that national dental care is to be carried out in

the course of 15 years, in all probability it will take at least twice that long to put the act into effect. At the end of that time, there will probably be at least twice as many dentists in private practice as in public service.

Through the aid of the national dental care program, large new groups of the population will become accustomed to systematic dental care, and therefore the program will contribute to a healthier people.

The Norwegian government, the Parliament—and thus the nation—and the Norwegian Dental Association are working together to carry through the public dental care program.

Incognitogaten 17

An anatomic and physiological approach to treatment of temporomandibular joint disturbances

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One of the problems common to both medicine and dentistry is dysfunction of the temporomandibular joint. Although the literature contains many controversial statements in regard to the temporomandibular joint, there is general agreement that this joint is one of the most complicated and unique joints of the body. In spite of the many controversies, much excellent work has been done by various investigators in the past few years. Because of these investigations, temporomandibular joint disturbances now can be classified, and this makes a more rational approach to treatment possible. While there are various classifications, the classification of Markowitz and Gerry,[1] resulting from work done at U. S. Naval Hospital, Philadelphia, appears to be the most workable. This classification of derangements of the temporomandibular joint is based on the following etiological factors:

1. Traumatic derangements (external injuries).
2. Malocclusion with resultant pain and disk derangement.
3. Arthritis: rheumatoid; osteoarthritic (degenerative, hypertrophic); infectious or suppurative.
4. Congenital or developmental (ankylosis, absence of condyle).
5. Extra-articular diseases manifesting themselves as temporomandibular joint symptoms (impacted third molars, tumors in adjacent regions).

This paper will be limited to the second group in the afore-mentioned classification; namely, derangements caused by malocclusion with resultant pain and

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1. Markowitz, H. A., and Gerry, R. G. Temporomandibular joint disease. Oral Surg., Oral Med. & Oral Path. 2:1309 Dec. 1949 3:75 Jan. 1950.

disk derangement. Previously this group was included with the group having traumatic derangements, the cause of the traumatic derangements being external factors while the cause of the derangements in the group with malocclusions being internal traumatic factors. Since the final results in both instances may differ in no way from the results of degenerative joint disease, many classifications label the derangements caused by malocclusion as degenerative joint disease secondary to trauma.[2] It is preferable to differentiate the type of derangement caused by malocclusion from the degenerative type since that caused by malocclusion can be successfully treated while the classification of degenerative type implies an irreversibility in pathogenesis, and as a result is less successfully treated. Again, the type caused by malocclusion is found in all age groups, while degenerative joint disease becomes apparent after the fourth decade of life.[2]

The symptoms that may be found with the type caused by malocclusion are:

1. Pain in the temporomandibular joint and adjacent area.
2. Pain about the temporal area.
3. Headache.
4. Earache.
5. Crepitus or clicking of the temporomandibular joint.
6. Trismus.
7. Pain on mastication.
8. Limited opening of the mouth.
9. Inability to bring teeth into tight occlusion.
10. Locking of the mandible in open-mouth position.

2. Bellinger, D. H. Internal derangements of temporomandibular joint. J. Oral Surg. 10:47 Jan. 1952.

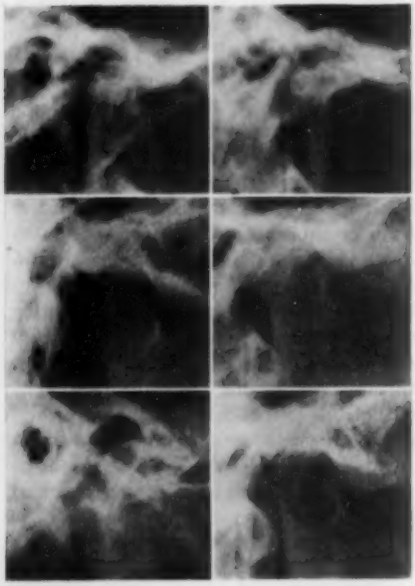

Fig. 1 • Left temporomandibular joint from external aspect

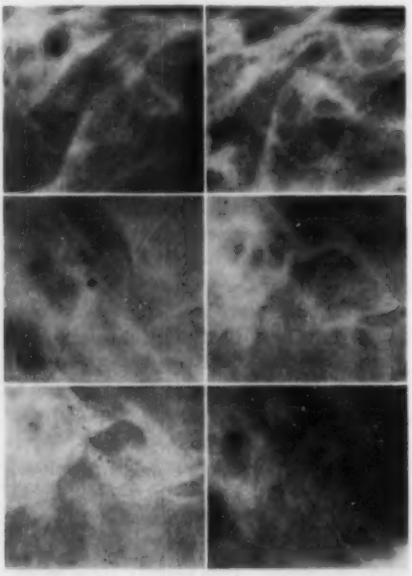

Fig. 2 • Same left temporomandibular joint as shown in Figure 1, from internal aspect

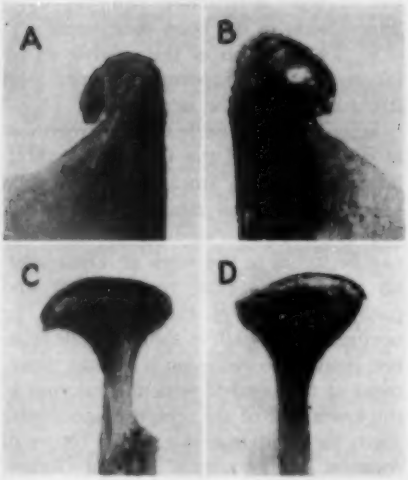

Fig. 3 • Condyle of same temporomandibular joint shown in Figure 1. A: External aspect. B: Internal aspect. C: Anterior view. D: Posterior view

These symptoms in any one patient vary in number, duration and acuteness. A patient exhibiting these symptoms must be thoroughly examined and the history of the patient should be kept in mind at the time of the examination. Various groups in the classification can be eliminated on the basis of etiology. Roentgenograms or laminagrams of the temporomandibular joint are helpful in eliminating some of the other types of derangement.

In the literature,[3] it has been shown that in temporomandibular joint derangements associated with malocclusion the following signs can be seen:

1. Narrowing of spaces between condyle and glenoid fossa, either uniform or asymmetric.
2. Widening of joint spaces.
3. Density changes in mandibular joint structures.
4. Wide excursion of condyles in open-mouth position.
5. Erosion of anterior surface of the condyle and posterior aspect of articular tubercle.
6. Changes in normal contour of glenoid fossa (deepening or shallowing).

OBSERVATIONS IN PRESENT STUDY

The afore-mentioned signs are used by many investigators as a basis for determining the position of the condyle in the glenoid fossa and for determining the change necessary in the position of the condyle.

In order to corroborate these observations, one half of a cadaver head was used. The use of half of a cadaver head automatically removed the problem of the superimposition of the opposite condyle and associated structures which makes it necessary that roentgenograms of the temporomandibular joint in a living person be taken at an angle. The objective was to get the best possible picture of the condyle and temporomandibular joint under the most favorable conditions. A series of roentgenograms of the temporomandibular joint was taken

3. Costen, J. B. Mandibular joint syndrome. Tr. Am. Acad. Ophth. 55:809 Nov.-Dec. 1951.

Fig. 4 • Normal path of closure of mandible from rest position to occlusion

from an external as well as internal aspect. Each roentgenogram varied a few degrees anteriorly-posteriorly or superiorly-inferiorly. From a superficial view of these pictures, it can be seen that the condyle assumes different proportions in every roentgenogram (Fig. 1, 2). The mandible then was dissected from the cadaver head and the condyle was photographed from the following aspects: external, internal, anterior, posterior (Fig. 3). In 12 roentgenograms taken under optimum conditions, there was no accurate reproduction of the condyle. If an accurate roentgenogram or laminagram of the condyle cannot be obtained, accurate roentgenograms or laminagrams of the temporomandibular joint and joint spaces are impossible.

As a result of the experiment described, the following conclusions were drawn regarding roentgenograms or laminagrams of the temporomandibular joint:

1. The joint spaces have no clinical significance because of variations in methods of angulation and variations in different individuals.

2. Although the temporomandibular joint can be viewed, it is possible to read into the pictures evidence of irregularities of bone destruction and any other abnormality of the bony structures.[4]

3. The position of the condyle in relation to other temporomandibular joint structures cannot be established.

Since it is impossible to plan treatment of disturbances of the temporomandibular joint resulting from malocclusion on a condyle to fossa relationship, another approach is indicated. This approach can be found in the work of Thompson[5] on the physiological rest position and path of closure of the mandible. The normal closing path of the mandible from rest position to occlusion is a hinge movement of the condyle with the fulcrum in the lower half of the temporomandibular joint, the condyle acting as the center of rotation. In the normal path of closure, the chin point and the mandibular incisors move upward and forward. The mandibular molars move in a smaller arc since they are nearer the fulcrum (Fig. 4).

Anatomically, the mandible can be displaced in the following directions:

4. Shapiro, H. H., and Truex, R. C. The temporomandibular joint and the auditory function. J.A.D.A. 30:1147 Aug. 1943.

5. Thompson, J. R. Normal and abnormal function of the masticating mechanism. Bul. Hudson Co. D. Soc. 20:21 Jan.; 20:25 Feb. 1951.

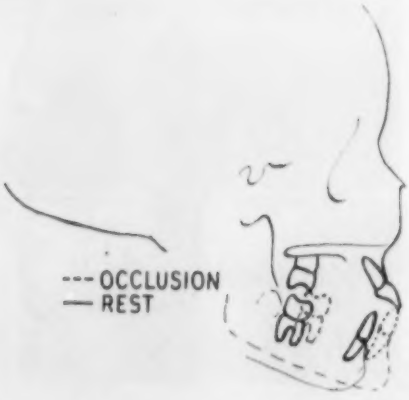

Fig. 5 • Anterior displacement of mandible

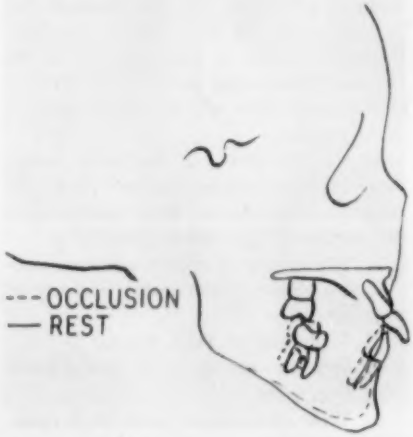

Fig. 6 • Posterior displacement of mandible

anterior (Fig. 5); posterior (Fig. 6); lateral (Fig. 7); anterolateral; posterolateral.

In diagnosing temporomandibular joint derangements caused by malocclusion, the first step is to determine whether the mandible exhibits any displacement, using the closure from rest position to occlusion as the criterion.[6] Correction of the displacement of the mandible becomes the major objective, and such correction can be achieved by the use of a number of technics. If no displacement of the mandible is found, then the operator should concentrate on achieving the best possible occlusion with the mandible in the original position. Bite raising, *per se,* should be discarded, since in this procedure the condyle remains in the same relative position, anteroposteriorly. The only reaction of the condyle to raising of the bite is a slight rotation with the center of rotation in the condyle.[7]

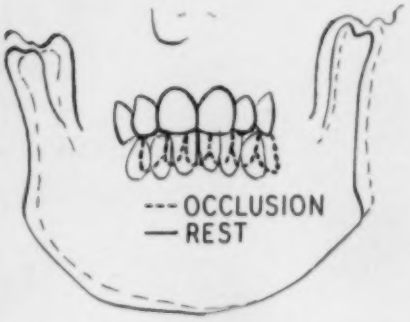

Fig. 7 • Lateral displacement of mandible

CONCLUSIONS

At the present time roentgenographic or laminagraphic technics are not successful for diagnosis of temporomandibular joint difficulties resulting from malocclusion. A more rational approach to diagnosis and treatment lies in the use of the physiologic rest position and path of closure of the mandible.

6. Sarnat, B. G., editor. The temporomandibular joint. Springfield, Ill., Charles C Thomas, 1951.
7. Schweitzer, J. M. Oral rehabilitation. St. Louis, C. V. Mosby Co., 1951.

Progress of Medical Science • Nobody will deny the great significance of the part played by the individual in the making of medical history, but we should also remember that the individual is to a large extent the product of his environment. At all times there are potential heroes and villains, potential men of genius. It is the structure of the society in which they live and the historical moment that determine whether they will be able to develop their genius and to what end they will apply it.

We must also keep in mind that discoveries are usually not made by one man alone, but that many brains and many hands are needed before a discovery is made for which one man receives the credit. The very popular hunting for "Fathers" of every branch of medicine and every treatment is, therefore, rather foolish; it is unfair not only to the mothers and ancestors but also to the obstetricians and midwives. *Henry E. Sigerist, "A History of Medicine," 1951, Vol. 1, p. 12.*

An evaluation of acrylic resin as a restorative material

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The need for a restorative material which lends itself readily to the cosmetic matching of tooth structure is great. Such a material, to be ideal, must have also the physical characteristics necessary for the replacement of lost tooth structure and for the prevention of dental caries. There is basis for the hope that the resins will develop into such a material.

The history and the development of acrylic resins have been covered in other papers; therefore, this paper is devoted to their clinical evaluation. Since the physical properties of the heat-processed acrylic resins do not differ fundamentally from the auto-polymerizing resins, the use of the former for the making of jacket crowns, facings and bridge prostheses will be considered also.[1, 2]

While maintaining their regard for the time-tested materials and technics, at the same time dentists should look forward to the perfecting of other materials which will be developed in the future; that is, the old should not be thoughtlessly discarded simply because it is old nor should the new be rejected solely because it is new. This philosophy prompted the author to begin a clinical investigation of the plastics in 1949. The resins used in restorative dentistry are still in the research phase and must be re-evaluated from time to time as they are improved and developed.

In order to obtain current data for the evaluation of resin as a restorative material, both in crown and bridge prosthesis and in operative dentistry, a broad and inclusive questionnaire was prepared and sent to one hundred well-known practicing dentists. Ninety-six per cent of these questionnaires were completed and returned.

While it is fully realized that a questionnaire seldom can take the place of responsible research, nevertheless, this questionnaire is significant because it reflects the total clinical experience of this group. The best test of any restorative material is its ability to render service in the mouth. The practitioner's experience obviously is a valuable indicator of that ability.

In response to the first question, "Have you used heat-processed plastics in bridge construction?" approximately 90 per cent of the dentists responded in the affirmative.

In reply to the second question, "Were the plastic portions stress bearing?" 40 per cent replied in the affirmative. The comments accompanying the replies to

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1. Coy, Herbert D.; Bear, David M., and Kreshover, Seymour J. Auto-polymerizing resin fillings. J.A.D.A. 44:251 March 1952.

2. Coy, Herbert D. Plastics in the field of operative dentistry: teaching and present status. J. D. Educ. 17: 41 Jan. 1953.

this question indicate that the majority of stress-bearing "all plastic" bridges are failures and that only in certain limited cases where the bulk of plastic was exceptionally thick did any give service longer than two or three years.

Several dentists expressed great enthusiasm for the use of acrylic resin in bridge work but only in nonstress-bearing areas. According to the responses, all posterior gold jacket crowns and pontics were made with gold occlusal surfaces and all gold anterior jacket crowns with a veneer of plastic. Figure 1 shows the teeth before and after a complete mouth rehabilitation with gold jackets—all with shoulders—cast fixed bridges and plastic veneer. These replacements have been in service since 1950.

In answer to question three, "Was there any irritation under bridge tips?" the majority replied in the negative. Two respondents stated that in cases where there was excessive pressure on the tissues there was much irritation but that this is true of porcelain also.

Although highly polished, well-cured plastic resins are tolerated by the oral mucosa, it has been observed frequently[3] that the acrylic resins are likely to attract debris at the gingival contacting surface, probably because of surface porosity. The accumulation of debris can be prevented by constructing the cast gold pontic frame so that there will be gold at the occlusal surface and also in contact with the gingival tissue.

Question four was, "How many years of service do you anticipate for acrylic bridges?" As pointed out previously, it was generally agreed that all bridges constructed entirely of acrylic resin are unsuccessful and that their average life is less than three years. Some of the questionnaires reported instances in which bridges, made with cast gold jackets, gold occlusal surfaces and veneers of acrylic resin, had been in service for ten years or more.

For any of the heat-processed resins,

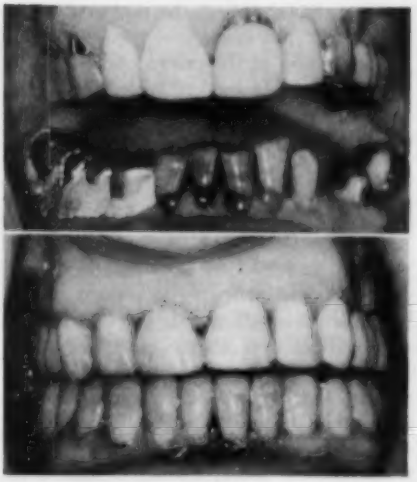

Fig. 1 • Above: Dentition before treatment. Below: Dentition after complete mouth rehabilitation. (Courtesy of I. Franklin Miller)

the tendency toward marginal discoloration is much less if heavy butt joints are used where the acrylic resin meets the gold box than if the usual method of spreading the material out to a knife edge is employed. Figure 2 shows three anterior gold cast crowns that have been faced with processed acrylic resin. The left central and right lateral incisors have been in service for four years with no visible tendency toward discoloration. In preparing crowns of this type, a regular shoulder jacket crown preparation is made; the labial portion of the preparation is reduced as much as possible to provide room for the acrylic facing which should be as uniformly thick as the preparation permits and never less than 1 mm.

A complete wax crown of the preparation is made, and the labial or buccal recess is cut out of the wax. It is im-

3. Yack, Douglas H. Indications for the use of plastic resins in crown and bridge prosthesis. J.A.D.A. 46:505 May 1953.

portant that the recess be undercut sufficiently but not enough to penetrate the labial portion of the crown. Acrylic resin should always be backed with solid metal to insure protection of the tooth if there should be any fluid exchange under the acrylic facing.

In answer to question five, "What has been your experience with plastic jackets?" only a few of the questionnaires reported any success with acrylic jacket crowns. A majority of the reports stated that such crowns are hopelessly inadequate. The chief reason given for their failure is the wearing through of the crowns by the action of the opposing teeth (Fig. 3).

Heat-processed acrylic jacket crowns often become loose, discolored and foul because of the decomposition of food debris beneath them; eventually caries may result.

The few respondents who reported any success had used acrylic jacket crowns in carefully selected cases and only after soaking the crowns in water for several days before cementing them in place. The crowns were then seated temporarily for several days before they were placed permanently. The opinions expressed in the questionnaire seem to contraindicate the use of heat-processed acrylic resin for jacket crowns and bear out the facts reported by the National Bureau of Standards.[4]

Fig. 3 • Result of wear on acrylic jacket crown. (Courtesy of Miles R. Markley)

In response to question six, "What experience have you had with direct filling resins?" the replies varied greatly; no unanimity was obtained concerning the use of this material. Approximately 25 per cent of the replies reported direct resin fillings as failures, causing sensitive teeth, recurrent caries and pulpal involvements. Another 25 per cent reported that the resins are superior to silicate cement, that they do not erode, that they cause fewer pulpal involvements and finally that though it is true that acrylic resin restorations occasionally show marginal stain, the silicate cement restorations also show similar staining.

Figure 4 shows an acrylic resin restoration and a silicate cement restoration placed in contiguous teeth at the same time, January 1950. It is obvious that in the resin restoration a color change occurred with age.

The manufacturers are gradually improving the resins. Color changes now are less noticeable than they were in the early development of the material probably because of an improvement in the chemicals used for activation.

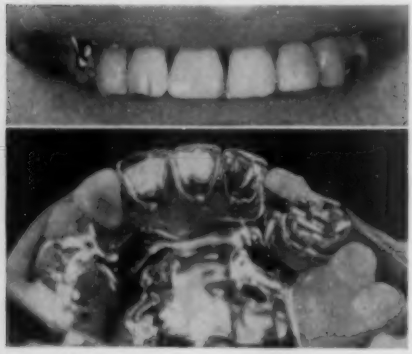

Fig. 2 • Above: Labial view of anterior gold cast crowns faced with acrylic resin. Below: Lingual view of same crowns. (Courtesy of Richard L. Simpson)

4. Nelsen, Robert J.; Wolcott, Robert B., and Paffenbarger, George C. Fluid exchange at the margins of dental restorations. J.A.D.A. 44:288 March 1952.

Fig. 4 • Acrylic resin filling in right central incisor; silicate cement filling in left central incisor

The remaining 50 per cent of the respondents reported in answer to this question either that they had not used the material at all or to such a limited extent that they would not venture to report on it.

In answer to the questionnaire, Robert F. Eastman of the School of Dentistry, Loyola University, New Orleans, gave the following summary of his observations made over a three year period at the University clinic, where more acrylic resin fillings are placed than silicate cement restorations:

1. The acrylics are saving the teeth for at least short periods of time as well as the silicate cements.

2. We observe very few loose acrylics, although more than we do silicates.

3. More patients complain of cold hurting the teeth for a few days after the acrylic is placed than when silicate is used, but there is only a very small number of such cases, these become comfortable after a few days.

4. Very few pulp deaths have occurred in teeth filled with acrylic. In almost every case where a pulp death was discovered after acrylic was placed, an exposure was found when the cavity preparation was examined carefully with a fine smooth broach. I feel strongly that acrylic is not killing the pulps.

5. The acrylics do not have good color stability. We have observed a few that have not changed color after two years, but most take on a yellowish hue.

6. Almost all acrylics develop a ditch of some kind around the margins which usually, but not always, turns brown.

7. In some mouths, recurrent caries is found and may be greater around acrylics than around silicates, and possibly amalgam and inlays. We do not extend our Class III acrylic and silicate preparations for prevention (in the sense that we remove sound tooth structure to carry labial and lingual margins to self-cleansing areas and the gingival beneath the free gum margin). In addition, leaving unsupported enamel on the lingual which is too thin and fragile, is apparently a fault that has been too common in our preparations. These two factors may account for some of the recurrent caries which has been observed.

At the Medical College of Virginia, School of Dentistry, approximately 1,200 direct resin restorations have been placed since the study of this problem began in 1949; and a close check has been kept on as many of these as possible.[5]

In December 1952 and January 1953 a check was made of 89 direct resin fillings which had been placed in the mouths of 49 patients. All the fillings were over two years old, and 20 of them were over three years old. All these fillings were in good condition except six which had to be replaced because of discoloration and marginal leakage. When a Burton Vitalometer was used, equally vital pulp responses were obtained in all these teeth as compared with the responses in corresponding teeth in the same arches. This result substantiates the observations from Loyola University, School of Dentistry, New Orleans, that direct filling resin is not a seriously disturbing factor in its reaction on the vital pulp.

Of the 1,200 acrylic restorations inserted since 1949, there have been only ten teeth with pulpal involvement in which resin fillings had been inserted. There may, of course, have been other instances of pulpal involvement in the teeth of patients who did not return to the clinic; but, nevertheless, there is sufficient evidence to show that no serious pulpal reaction can be ascribed directly to the direct filling resin. This conclusion

5. Coy, Herbert D. Direct resin fillings. J.A.D.A. 47:532 Nov. 1953.

is in direct contradiction to Grossman's summary.[6]

If a resin filling becomes loose, it usually does so almost immediately after insertion, probably during premature finishing. It is difficult to detect a loose resin filling; but if such a condition is allowed to exist, the tooth will become sore, and the continual pumping of fluid into the dentinal tubules may eventually cause the death of the pulp. There will be an odor under these loose fillings as there would be under a loose filling of any other filling material. The removal of many resin fillings with a rubber dam in place has failed to reveal any odor unless the filling was loose. This observation is not in accord with Rosen's conclusions.[7]

In their advertising, manufacturers repeatedly make the statement that a filling made of resin can be finished in 15 minutes after insertion. A dentist who attempts to finish a resin filling in that time is making a poor filling. Polymerization is not completed for several hours, and the finishing should not be attempted until the material has reached its maximum hardness, that is, approximately 24 hours after insertion.

At the Medical College of Virginia, School of Dentistry, the pressure technic has been discarded, and only the Nealon or compensating brush technic is used.[8] All Class III cavities should be boxed in with an aluminum matrix material. This procedure aids in the building of the resin to tooth form and avoids the application of an excessive amount of material, which would have to be removed later and which might cause the loosening of the filling in the finishing procedure.

In Figure 5 is shown the application of the matrix. The technic of applying the resin with a brush, even though great care must be exercised in each step, is a simple one. The monomer is placed in one container and the polymer in another. A no. 000 sable hair brush is dipped into the monomer to about a third of the length of the bristles. The moistened brush is then touched to the surface of the powder so that it picks up a bead of polymer the size of a pin head. It is a common fault to pick up too large a bead. The process is repeated at intervals of about one minute until the cavity is filled. If the surface loses its sheen, it is too dry and should be moistened with monomer. Any mixture added with a brush should be added to a shiny surface.

The field of operation must be kept dry. Excess monomer should not be allowed to contaminate the polymer, but it is even more important to avoid contaminating the monomer with polymer. The brush should always be wiped clean

6. Grossman, Louis I. Pulp reaction to the insertion of self-curing acrylic resin filling materials. J.A.D.A. 46:265 March 1953.

7. Rosen, Ralph. Plastics—today's $64 question. J. Missouri D. A. 32:229 July 1952.

8. Nealon, F. H. Acrylic restorations: operative non-pressure procedure. New York J. Den. 22:201 May 1952.

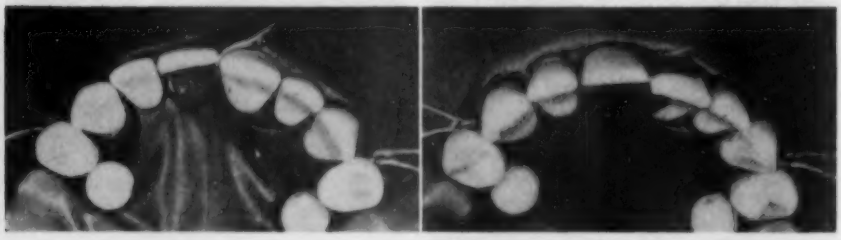

Fig. 5 • Application of the matrix

before being brought into contact with the liquid again. If any powder gets into the liquid, it will start a premature chemical reaction and neutralize the activation.

Gold foil, when properly and skillfully handled, can be made into a restoration superior to all others in every way except in cosmetic appearance. It should be employed in all cases where permanency of the restoration is of paramount importance. It must be pointed out, however, that the proper use of gold foil requires a high degree of skill which can be acquired only by proper training and continuous study. There is no poorer restoration than an improperly made gold-foil filling. Many members of the profession do not seem to realize the importance of manipulating dental materials to produce the maximum physical properties, especially in the case of amalgam, silicate cement and the direct filling resins.

An amalgam filling poorly made will sometimes give service for a number of years, and a silicate cement improperly mixed and poorly manipulated scarcely ever results in an immediate failure. A resin filling differs from an amalgam or a silicate cement filling in that it will be a failure almost immediately if an improper technic is employed.

Although direct resin fillings are not in a class with gold-foil fillings, the two are similar in one respect: there is no middle ground—either they are a success or a failure almost immediately.

The making of a direct resin filling requires strict adherence to a technic that produces the maximum qualities. The most satisfactory form of cavity is the box type with no cavosurface bevels. As in processed crown and bridge prostheses, it is important always to have a bulk of material and no thin, knife-edge margins. Furthermore, only the most superficial finishing should be done at the time of insertion. The finishing should be done with a sharp scalpel and with no. 601 plain cut fissure burs and large round burs. The scalpel is used in preference to a gold knife because the blade is much thinner. The filling usually presents a better appearance if it is not highly glossed. No frictional heat should be allowed to develop during the polishing. Only when the careful handling of this material is observed has it any possibility of success as a filling material.

SUMMARY

1. The use of resin for all plastic jacket crowns and all plastic stress-bearing bridges is contraindicated.

2. The use of resin as a veneer on gold jacket crowns and bridge pontics is recommended first, because it is easier to process than porcelain and second, because its cosmetic appearance is better than that of porcelain.

3. The color stability of the direct filling resin is not ideal but has been greatly improved by the manufacturers.

4. The Nealon, or compensating, method of insertion with a brush is superior to the pressure method.

5. The direct filling resin is not a seriously contributing factor in pulp deaths.

6. The ultimate status of the direct filling resins cannot be predicted at this time.

7. Significant improvements have been made in the direct filling resins, but much is yet to be accomplished in perfecting them.

Common problems in the construction of the full cast crown

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Since the advent of improved casting technics, the full cast crown has gradually replaced the shell crown as the restoration of choice in extensive rehabilitation. Many of the same errors inherent in the shell crown technic, such as overhanging margins and poor contour, are being repeated in the cast crown; and the advantages of the more accurate casting technic are not being realized fully. The test of a technic is whether by the use of the technic the operator can make several crowns, all from different impressions of the same model and interchangeable on all the dies and the master model.

INSUFFICIENT TOOTH REDUCTION

Failure to reduce the tooth sufficiently results in poor contour and perforation either during the process of finishing and polishing or prematurely through wear.[1] In the search for a guide to proper tooth reduction, it was observed that the anatomy of the dentin in longitudinal and sagittal sections closely resembled that of an ideal full crown preparation. From this observation was developed the principle of complete removal of the enamel in a "true standing" tooth.

Such a procedure has several advantages. By removing the enamel, the operator can use the dentinoenamel junction as a guide to the proximity to the pulp. In the dentin medium, it is easier to round or remove sharp angles, and less frictional heat is produced. Furthermore, the preparation time is shortened, sufficient clearance is assured, and the smooth preparation that results facilitates the making of the impression.

PROBLEMS DUE TO CARIOUS TEETH

Carious teeth present varying degrees of difficulty depending on the amount of destruction that has taken place. The usual procedure for moderately damaged teeth is to restore the lost surfaces with cement or amalgam;[2] but when three or more contiguous walls have been lost, the preparation of a full crown becomes exceedingly difficult. There are two basic approaches to the solution of this problem. One is to restore the walls with amalgam by means of intracoronal retention before any cutting is done. The other is to secure intracoronal retention for the crown.

If sufficient tooth structure remains, a box may be cut in an intact wall, an ivory no. 9 matrix retainer and band are then applied, and the tooth is filled with

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1. Belding, P. H. Gold crown comes into its own. D. Items Interest 71:873 Aug. 1949.

2. Hamilton, G. M. Cast crown technic for badly broken down posterior teeth. J. Nebraska D. A. 23:3 March 1947.

amalgam. If the cutting of a box would destroy too much of the remaining tooth structure, a channel may be cut with a no. 700 bur into the root at the dentinoenamel junction in the region of the missing walls to a depth of 2 mm. A matrix is then applied to the tooth, and the crown height is restored with amalgam. This procedure is especially useful when all the walls up to the gingiva have been lost. Because of the extensive recession of the pulp that has taken place, it can be accomplished without exposing the nerve.

When intracoronal retention for the crown is desired, the tooth may be filled with cement so that a shoulder remains. In the region of the missing walls one or more parallel pits are then cut 2 mm. in depth with a no. 700 bur. Gold wires are fitted into the pits, and the compound impression is made with them in position. The crown is waxed onto the wires, and the gold is cast directly to them. In some teeth, parts of the walls may remain above the gingiva. This tooth structure can be utilized for the creation of a shoulder to produce walls which are more nearly parallel and thus to increase the retention of the crown.

When all the walls up to the gingiva have been lost, another alternative procedure is to sink a pit in each corner of the tooth. The pins which fit into the pits plus the millimeter or two of preparation below the gingiva provide sufficient retention for the crown. In such a situation it may be necessary to perform a gingivectomy in order to expose more tooth structure.

The crowns of some devitalized molars can be re-enforced with amalgam by using the pulp chamber for retention; but if there is not a sufficient amount of tooth structure remaining, a post and a dummy are cast with the distal canal in lower teeth and the palatal canal in upper teeth used for retention. When nonvital bicuspids are prepared for posts, the palatal canal is used for retention in preference to the buccal canal because its direction provides easy access during the preparation of the root canal.

MORPHOLOGICAL CONSIDERATIONS AFFECTING THE FIT OF THE CROWN

There is often difficulty in seating a casting on a long-crowned tooth. Since the increased bulk of gold causes excessive shrinkage when the casting cools, much time is lost in attempting to seat the crown. This binding can be avoided by increasing the degree of taper of the preparation; because of the length of the opposing walls, this procedure involves no loss of retention. In short-crowned teeth, however, the walls are prepared as nearly parallel as possible in order to increase retention. In this type of situation it may be necessary to resort to secondary retention obtained by the incorporation of pits, grooves or boxes in the preparation. Retention can be increased also by investing with a control powder to reduce the expansion of the mold.

PROBLEMS DUE TO ABNORMAL POSITION OF TEETH

Occasionally the operator is confronted with a situation where the loss of contact through caries or extraction has resulted in a shifting of the adjacent teeth so that they lie within the path of insertion of the tooth to be restored. When the preparation of the tooth has been completed, the interproximal space is widest at the gingival base. It is difficult to make a compound impression of this tooth and impossible to construct a crown that will have proper contact with the adjacent teeth. In order to avoid such a situation, the adjacent teeth are ground at the marginal ridges if the tipping is not too great. If the tipping is excessive, the teeth are sliced in anticipation of the construction of inlays after the crown is inserted.

A rotated tooth presents little difficulty

until the attempt is made to recontour it to normal anatomy. Since the shape of the root is the key to the shape of the crown, it is impossible to restore proper buccolingual contour. All that can be done is to obtain a more normal occlusal plane with good occlusion and contact with the adjacent teeth.

Much difficulty is encountered during the preparation of the distal surfaces of mesially tipped molars because the occlusal surfaces of the bicuspids and cuspids prevent the handpiece from assuming a position where the disk will cut without producing a shoulder. This problem is eliminated by the use of a cup-shaped diamond disk, which forces the operator to direct the handpiece toward the maxillary teeth in order to cut in line with the distal surface.[3]

When a correction of occlusion is desired for teeth in buccolingual version, a more favorable result can be obtained if restorations are planned for both upper and lower teeth. In this way the overcontouring of one tooth can be reduced. In order to obtain a more favorable occlusion in the course of reconstruction, it must always be kept in mind that it is not only permissible but sometimes imperative to grind the opposing teeth. By deepening the fossae of opposing teeth, the heights of cusps of the restorations can be raised and the cusps brought into a more efficient lateral function.

GINGIVAL RETRACTION AFTER INSERTION OF THE CROWN

There has been considerable controversy in recent years over the correct location of the margins of the crown. The controversial point is whether to end the margins above, at or below the gingiva. While there are certain technical advantages to be gained by ending the margins at or above the gingiva, the resultant preparation and restoration are not immune to caries, and at the same time they have less retention if sufficient tooth structure is removed to allow for proper contour and bulk of gold. Often the presence of decay at the gingiva forces the operator to extend the preparation below the gingiva. In situations where there is extensive gingival recession and the caries index is low, however, the finishing line of the crown should end at the cementoenamel junction.

It is widely accepted that the more the margins of the crown are covered by the gingiva the longer the tooth will be immune to caries. This view is reinforced by the observation that teeth restored by poorly fitting shell crowns seldom decay because the hypertrophied gingiva always covers the margins. The problem is how to make a cast crown whose finished margins are beneath the gingiva but do not impinge on it. Preparing below the gingiva without traumatizing it is exceedingly difficult. The gingiva on healing recedes and exposes the margins of the crown.

This result can be avoided in many cases by dividing the preparation into two stages. In the first stage the tooth is prepared as close as possible to the gingiva without traumatizing it. A crown form which is one size larger than the tooth is selected, it is trimmed and its margins are turned in with a curved nose pliers so that when the form is placed on the tooth in correct occlusion, the margins extend to the depth of the gingival crevice. The buccoocclusal margin of the form is contoured to the height of a cusp in order to prevent cheek biting. The form is then fixed in position with temporary cement. The oversized band and the excess cement force the gingiva down and away from the tooth.[4]

In the second stage, after the crown form has been removed, the now high finishing line is carried down to half the

3. Strum, J. Z. Technic for an improved cast crown. New York D. J. 16:313 June-July 1950.

4. Tylman, S. D. Theory and practice of crown and bridge prosthesis, ed. 2. St. Louis, C. V. Mosby Co., 1947, p. 351.

depth of the widened crevice by means of an inverted-cone face-cutting diamond stone.[5] This procedure is usually accomplished with a minimum of trauma to the gingiva. The impression and the bite are taken, and then a snug-fitting crown form is selected and trimmed short of the gingiva to allow it to return to a more normal position. This procedure allows the operator to carry the finishing line to a point where the gold margin will be covered by the gingiva and at the same time permits him to operate with a minimum of trauma to the soft tissues. If, however, it is desirable to complete the preparation in one visit, the finishing line can be carried below the gingiva by the judicious use of the inverted-cone face-cutting diamond stone.

DIFFICULTY IN REMOVAL OF THE COMPOUND IMPRESSION

The difficulty in removing impressions, that is, if there are no undercuts within the preparation, is usually caused by the trapping of large bulks of compound below the finishing line in the undercut regions of the tooth. The larger the bulk, the greater is the resistance to removal and the greater the chance for distortion. In order to prevent the formation of excessive bulk, the following steps are suggested:

1. *Annealing the Band* • Annealing the band is an aid in the selection of the proper size, since the copper adapts itself easily to the gingival contour of the tooth. Often an unannealed band appears to be snug-fitting, but because of the tension of the band it may be binding at two or three points and not in contact at others. The resulting spaces permit the compound to flow into the undercut regions; and when the compound has chilled, the impression resists removal. Annealing also removes the tension in the band so that when the chilled impression is removed, the band has no tendency to return to its original shape and cause distortion. By adapting itself uniformly to the tooth, the annealed band aids also in producing a finishing line that is uniformly sharp.

2. *Choosing a Snug-fitting Band* • A snug-fitting band, because it contacts the tooth at the gingiva, permits only a small amount of compound to pass the finishing line. When removal is attempted, this thin piece of compound is easily fractured; and the impression can be removed with little or no difficulty. Furthermore, because of the high viscosity and the short time of flow of the compound, a snug-fitting band is desirable to reduce the amount and duration of the placement pressure necessary to produce a sharp impression.

Actually, with a properly fitting band practically no pressure is necessary. The reason is that compound in its molten state obeys the physical laws of liquids; that is, a fluid is incompressible. The slight pressure necessary is used to place the compound and to maintain it in position while the impression is being chilled. The application of excessive pressure not only does not result in a sharper impression, but it causes the compound to creep and thus to produce distortion.

3. *Festooning the Band Accurately* • If the band extends considerably below the finishing line, there is a possibility that some compound may be carried into the undercut regions of the tooth and may resist removal. A simple method of festooning the band is to identify the buccal surface and to place the band on the tooth in the direction of the long axis of the preparation. The correct relationship between the two shortest surfaces—usually the proximal surfaces—is

5. Thom, L. W. Principles of cavity preparation in crown and bridge prosthesis. I. The full crown. J.A.D.A. 41:284 Sept. 1950.

brought about by trimming the shorter of the two. The lingual surface which is most often next in length is then related to the proximal surfaces. An even amount is cut from the three previously trimmed surfaces without altering their established relationship until the buccal portion of the band assumes its proper position beneath the gingiva. The final correction of the festooning is made after the first impression is completed by cutting any portion of the band which extends below the finishing line. Some operators cut all the way to the finishing line so that when the die is made the end of the band forms the finishing line and there is no question as to its location. In order to allow for some margin of error, a slight portion of the band should extend beyond the finishing line so that the operator can be sure that his impression includes the entire preparation. If the impression is sharp, the finishing line on the die also will be sharply defined and easily read. Occasionally the operator finds that after the band has been festooned it is shorter than the preparation, that is, the incisal portion of the tooth protrudes from the pressure end of the band. In that case the band must be lengthened to include the entire tooth and some portion beyond it so that the band can be grasped to remove it. This increase in length is accomplished by telescoping the next larger size band onto the one already festooned and then joining the two with gold solder in the open flame.

LACK OF COMPOUND AT THE GINGIVA

When the band filled with compound is inserted on the tooth, the tooth acts as a plunger forcing the compound out of the band. It is important to prevent this action, because the high viscosity and the short working time of the compound make it impossible to force it back to the gingival portion of the band. This action can be prevented by roughening the inner surface of the gingival portion of the band with a stone, drying the band thoroughly and luting the gingival compound to the band with a hot plastic instrument in order to assure a good union.[6] The use of lubricants while handling the compound is to be avoided since they may prevent the compound from sticking to the band.

CRUSHING OF THE BAND DURING REMOVAL

If the full length of the band is grasped in order to remove it from the tooth, the pinching pressure of the fingers on the gingival portion of the band will cause it to collapse after the impression has separated. If the band is grasped as near as possible to the pressure end, where there is a solid bulk of compound, the danger of distorting it is eliminated. Therefore all excess compound should be removed to allow the placing of the thumb and forefinger as near as possible to the top of the band. A gauze square placed over the band prevents the fingers from slipping off the band.

Interproximal compound if left in place interferes with the removal of the impression when adjacent teeth are present.[6] This compound breaks off when it passes the contact points of the adjacent teeth, and part of the impression may be broken or the band may be distorted. This result can be avoided by removing all excess compound before separating the impression from the tooth.

DISCREPANCIES IN THE BITE

The three most common errors in taking a bite impression are an incorrect record of the patient's centric occlusion, an indefinite impression of the preparation which permits false placement of the die,

6. Klaffenbach, A. O. Present-day technics in the construction of full crowns on posterior teeth. Internat. D. J. 1:28 June 1951.

and distortion of the impression during removal.

An incorrect record of the patient's centric occlusion can be avoided by checking the patient's centric occlusion on the opposite side of the mouth before the wax is inserted and then comparing it with the centric occlusion recorded while the wax is in the mouth.

A more accurate impression of the preparation can be gained by filling the recess of the impression with some suitable relining material and reseating it. The patient is then instructed to close slowly until the teeth fit into the indentations previously made and then to make the final closure. The opposite side of the mouth is rechecked for correct centric occlusion. It is important to use a light-colored relining material so that an indelible mark can be transferred from the die to the bite record in order to check the correct placement of the die. The countermold of the bite record should be poured in stone prior to articulation in order to prevent distortion of the wax when the die is seated. When multiple crowns are to be constructed, the wax bite introduces too much chance for error. In this situation it is wiser to construct transfer copings, to place them on the teeth and then to take a plaster impression of the entire mouth along with a complete countermold. The bite relationship is then determined by means of two wax indexes or with a bite-block.

Because the jaw opens in an arc, the greatest amount of distortion takes place on the side which separates first. It is therefore desirable that the least amount of distortion should take place on the preparation side. As a general rule, therefore, the countermold is separated first. The bite record can then be lifted off the preparation in its line of withdrawal.

OVERHANGING MARGINS

Often the wax pattern is overextended beyond the finishing line to the band line of the die. The result is a reproduction in the crown of the situation that existed when the impression was taken. Since the ends of the band cannot be adapted to the tooth surface below the finishing line, reproducing them in gold can result only in overhanging margins which impinge on the gingiva. The section below the finishing line is slightly undercut, but the wax will tend to jump the undercut and spring back. When the crown is cast and returned to the die, the margins bind at the finishing line, and the crown is seated with difficulty. If the overextension is removed at this stage, the overhanging margins will be eliminated although it is probable that the margins have already been distorted away from the die. It is important therefore that all overextended wax be removed before the crown is cast.

IMPROPER CONTOUR

Care must be taken during the waxup not only to reproduce correct contour but to restore the height of contour at the gingival third of the buccal surface. This bulge is necessary to protect the gingival crest from the impact of the bolus of food as it is forced out from the occlusal table into the mucobuccal fold.[4] The absence of the bulge allows the impact of food to traumatize the crest, and recession will follow, causing the exposure of tooth structure and increasing the possibility of decay in this region.

INCORRECT SEATING DURING CEMENTATION

After the crown has been cemented, it is distressing to have the patient complain that it is too high.[4] All the care that has been taken up to this stage is nullified by incorrect seating, which is caused by filling the crown with too much cement or using too thick a mix. The desired mix is one in which a strand of cement just breaks when lifted from the slab. While

the crown is being filled with cement, care should be taken to prevent any cement from flowing onto the inner occlusal surface. In this way the cement will be driven to the occlusal margin when the crown is placed in position, and the crown will seat correctly. If the occlusal surface of the crown is covered with cement, the hydraulic pressure created is too great; and therefore it will be impossible to force all the excess cement out through the marginal space. An incorrect seating will result.

FAULTY OCCLUSION

A crown must have good proximal contact and not be high in centric or lateral working positions and excursions. If proximal contact is lost during polishing, it can be restored easily by flushing the surface with a piece of solder. One of the most common errors is to allow a crown to have too much occlusal surface contact[4] so that it is inefficient and subjected to too much masticating pressure during function. Surface areas must be reduced in size until only point contacts remain. In this way the crown can function more efficiently with less pressure necessary to chew the bolus. The crown should be checked also for trauma in the balancing position and in excursion, since trauma will result not only in the destruction of the bone around the crowned tooth but also around its antagonist. If possible, all contact in this excursion should be removed; the trabeculation of bone in upper molars is not designed to receive even a slight increase in palatal force. In the last analysis, assuming that all other basic requirements have been met, occlusion is the one factor which will either cause the ultimate loss of the tooth or produce a long-standing restoration.

SUMMARY

1. The indirect compound impression procedure can be a clinically accurate method for the construction of a full cast crown. The proof is the fact that interchangeable crowns can readily be made from separate impressions of a master model.

2. Insufficient tooth reduction can be avoided if all the enamel is removed in a "true standing" tooth. Perforation is thereby obviated, and space for proper contour is assured.

3. Badly decayed teeth can be restored by the use of full crowns without resorting to pulp devitalization. Intracoronal retention can be used for restoration of the tooth with amalgam before the preparation of the crown is made or for direct retention of the crown.

4. Opposing teeth can be ground in order to gain a more favorable occlusion.

5. Gingival recession can be minimized by the division of the preparation into two phases. A crown form is used to retract the gingiva so that on the second visit the preparation can be carried below the gingiva with a minimum of trauma to the soft tissues.

6. Difficulties in impression making can be eliminated by the use of an annealed, snug-fitting and accurately festooned band. An increase in pressure will not produce a sharper impression, since a fluid cannot be compressed. Excessive pressure results in distortion of the compound.

7. Errors in the bite can be prevented by checking the patient's centric occlusion on the normal side before insertion of the wax and then comparing it with the centric occlusion recorded with the wax in position. The counter should always be separated first and the recess of the impression relined so that the die will have an accurate seat in the bite record.

8. Overhang and distortion of the margins can be prevented by the removal of all wax beyond the finishing line.

9. Reproduction of the buccal height of contour is important in order to protect the soft tissues from the impact of food.

10. Covering the inner occlusal surface of the crown with cement may result in a faulty seat during cementation because of the tremendous hydraulic pressure developed.

11. Assuming that all other basic requirements have been met, occlusion is the one factor which will cause the ultimate loss of the tooth or insure a long-standing restoration.

The effects of drugs in the treatment of necrotizing ulcerative gingivitis

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The following groups of drugs have been used in the treatment of necrotizing ulcerative gingivitis: oxidizing agents, escharotics, aniline dyes, mercurial derivatives and spirocheticides. Nearly every drug used in the treatment of this disease has been reported to be effective. Success has been claimed frequently for the use of penicillin in topical applications,[1-4] lozenges (troches or pastilles),[5-8] mouthwashes,[9-12] oral administrations[13] and intramuscular injections.[14-17] Many of the clinical studies on penicillin and some of the other drugs, however, have not been properly controlled or had no controls at all. Some clinicians treat necrotizing ulcerative gingivitis with drugs only, while others use drugs only as an adjunct to treatment. For these reasons, it was felt that a study of the effects of drugs on lesions of necrotizing ulcerative gingivitis was timely.

To determine whether this disease is self-limiting, that is, healing without treatment, seven cases of necrotizing gingivitis were diagnosed but not treated. The period of observation without treatment was from three to 22 days. Not one of these patients improved clinically, and

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2. Thexton, R., and Dick, P. K. Penicillin packs in the treatment of Vincent's infection. Brit. D. J. 78:292 May 18, 1945.

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4. Weiner, Leonard. The use of penicillin in clinical dentistry. J.A.D.A. 32:538 May 1945.

5. Glickman, Irving. The use of penicillin lozenges in the treatment of Vincent's infection and other acute gingival inflammations. J.A.D.A. 34:406 March 15, 1947.

6. Strong, L. W., Jr., and Willett, E. W. Penicillin lozenges in the treatment of Vincent's stomatitis. U. S. Naval M. Bull. 46:353 March 1946.

7. Atkinson, H. F. Observations on the treatment of over a hundred cases of acute ulcerative gingivitis with penicillin pastilles. Brit. D. J. 79:317 Dec. 7, 1945.

most of them became progressively worse. It must be understood that it is imperative to begin the treatment of the lesions as soon as possible; however, these cases were observed without treatment for research purposes.

A pilot study of four drugs was made to determine their effectiveness in relieving symptoms. In this study, except for troches of penicillin, all the drugs were used in the form of mouthwashes; and the patients were not permitted to drink, eat or smoke for one hour after using them. In all, 35 patients were treated.

Four patients were treated with penicillin troches (500 units), one every two hours. This method was the most effective, eliminating the symptoms of pain, gingival bleeding, foul odor and bad taste much faster than the other methods.

Ten patients were treated with penicillin G (crystalline, 100,000 units in 10 cc. of sterile distilled water) as a mouthwash for five minutes once daily. This was the next most effective method.

The third most effective method was the use of penicillin G (crystalline, 25,000 units in 10 cc. of sterile distilled water) as a mouthwash for five minutes once a day. Eight patients were treated in this group.

Eight patients were treated with neoarsphenamine (450 mg. disolved in 10 cc. of sterile distilled water) as a mouthwash for five minutes once daily. This drug was not nearly as effective as penicillin but was more effective than oxophenarsine hydrochloride or hydrogen peroxide.

Three patients were treated with oxophenarsine hydrochloride (40 mg. dissolved in 10 cc. of sterile distilled water) as a mouthwash once daily for five minutes. This drug was not as effective as neoarsphenamine or penicillin.

The least effective method was the use of hydrogen peroxide 3 per cent (diluted with an equal amount of water) as a mouthwash three times daily after meals. In this group two patients were treated. From the results of this pilot study, a controlled survey on the effects of penicillin was planned.

CONTROLLED EXPERIMENTAL PROCEDURE

Because penicillin troches were outstandingly superior to all other forms of drugs in the pilot study, it was decided to evaluate their effects in the treatment of necrotizing ulcerative gingivitis. Fifty-six patients were treated in this study, of whom 33 were in the penicillin group and 23 in the control group. There were 19 males and 14 females in the penicillin group; their average age was 24.2 years; the youngest was 17 years of age and the oldest 36. In the control group there were 12 males and 11 females; their average age was 24.2 years; the youngest was 16 and the oldest 39. The patients in the penicillin group received penicillin troches (1,000 units), whereas the patients in the control group received placebo troches (sucrose colored yellow, with no drugs). Since it was evident from the pilot study that in order to effect a complete cure, curettage, prophylaxis

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14. Wright, A. C. Penicillin: treatment of acute ulcerative gingivo-stomatitis in private practice. Brit. D. J. 79:100 Aug. 17, 1945.

15. Areinoff, Walter. Penicillin in the treatment of Vincent's infection. J.A.D.A. 34:612 May 1, 1947.

16. Pearce, W. F., and McDonald, J. B. Treatment of ambulatory patients with penicillin sodium; preliminary studies of fusospirochetosis. J.A.M.A. 128:342 June 2, 1945.

17. Sweeney, J. S., and others. Therapeutic effectiveness of penicillin in treatment of Vincent's stomatitis and its failure to influence favorably certain other medical conditions. J. Lab. & Clin. Med. 30:132 Feb. 1945.

and interdental brushing with massage after each meal were essential, both groups received the same adjunctive treatment.

The first phase of treatment was the daily self-administration of troches, either penicillin or placebo, one every two hours for two or three days only. On the third day the troches were discontinued, but prophylaxis and home care according to instructions were instituted and completed. The patients were considered to be cured when the ulcers appeared to be healed clinically and the symptoms of inflammation, pain, bleeding and pseudomembrane formation were eliminated.

In addition, 36 biopsies of specimens from the same number of patients were made before treatment, 19 after the administration of troches and 15 on completion of the treatments.

RESULTS

Of the 33 patients treated in the penicillin group, all except 2 were cured. The two failures occurred in cases where gingival flaps were present over partially erupted teeth. In the control group all except 1 of the 23 treated were cured. In the one case of failure in this group the massage and the brushing were inadequate; in other words, the patient failed to cooperate and did not brush interdentally after each meal. The only effect of the placebos was psychological. The average duration of time to effect a cure was shorter in the penicillin group than in the control group. It was necessary to perform a gingivectomy on 1 patient in each of the two groups because the necrosis produced pockets.

The biopsies made before treatment revealed that there was an ulcer in part of every section. The region devoid of epithelium consisted of necrotic tissue which was infiltrated with plasma cells, lymphocytes and occasionally polymorphonuclear leukocytes (illustration, above). The findings of the biopsies made before treatment were reported previously.[18] A comparison of the biopsies made immediately after the administration of the penicillin or the placebo troches with those made before treatment showed no significant difference. All 19 specimens were still ulcerated, but there was a slight reduction in edema and inflammatory cells. There was no notable difference between the specimens taken after the administration of penicillin troches and the ones taken after the administration of placebo troches.

The specimens taken after the completion of treatment in both the penicillin and the placebo groups were quite similar, but there were many differences between the specimens of these two groups and those taken before treatment was begun. After treatment, usually the connective tissue was covered completely by the epithelium. No ulcers or necrotic tissue could be seen (illustration, below left). In some cases in both the experimental and control groups the epithelium clinically appeared to be healed; however, microscopic examination revealed that the epithelium was not always continuous and that breaks were still present (illustration, below right). The 8 specimens from the penicillin group and the 7 from the control group showed various stages of healing from incomplete epithelization to complete epithelization with keratin formation.

DISCUSSION

In the pilot study, penicillin was by far the most effective drug in alleviating the symptoms. It was interesting to note that a small dosage (500 units) held in the mouth until dissolved (one troche every two hours) was more effective and relieved the symptoms more quickly than

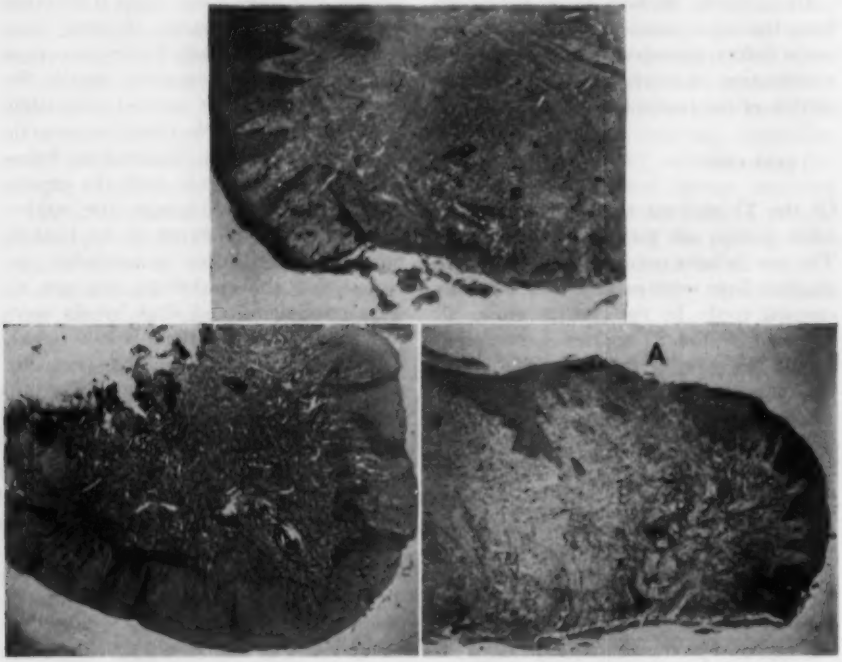
18. Schaffer, E. M. Biopsy studies of necrotizing ulcerative gingivitis. J. Periodont. 24:22 Jan. 1953.

large doses (100,000 units) used once a day. It was evident from the pilot study that in order to effect a complete cure, curettage, prophylaxis and interdental brushing with massage are essential.

Likewise it is imperative to eliminate all periodontal pockets, gingival pockets and gingival flaps partially covering the crowns of the teeth. If such pockets and flaps are not removed, the result may be the recurrence of necrotizing ulcerative gingivitis or chronic progressive periodontal disease with the initiation of or an increase in alveolar bone loss.

Brushing and massage appear to be valuable adjuncts to the treatment of this disease; it was noted that the condition of the one patient who would not follow instructions did not respond to treatment. Interdental brushing and massage after eating apparently reduce debris in which bacteria may be harbored. Presumably, massage makes the tissues more resistant by increasing their tone and circulation.

In clinical examination the tissues appeared to be healed after treatment, but in some cases a microscopic examination revealed breaks in the epithelium which might favor a recurrence of infection.



Above: Specimen of necrotizing ulcerative gingivitis before treatment. Epithelium is not intact; exposed connective tissue is infiltrated with inflammatory cells. Below left: Specimen from patient in control group 20 days after beginning of treatment. Epithelium is partially keratinized and completely covers the connective tissue. No ulcer is present. There are some inflammatory cells in connective tissues. Below right: Specimen from patient in penicillin group, same patient as in the upper part of figure; specimen taken from adjacent papilla on completion of treatment, 21 days after beginning of treatment. Although clinically papilla appeared healed, connective tissue is not entirely covered by epithelium at A. Some inflammatory cells are present

This revelation emphasizes the importance of continuing to see the patient longer than just a few weeks. It is important to see the patient at least four weeks after treatment and periodically every four months for a year or more thereafter.

This study demonstrated that the reasons for medication are the following: (1) to produce a bactericidal effect, (2) to reduce pain, (3) to reduce hemorrhage, and (4) to prepare for the other essentials of treatment which make curettage easier. If medications are used alone without any other therapy, the symptoms may be ameliorated, but an exacerbation may occur later. A persistent or recurrent low grade infection may produce pockets; or if pockets are already present, it may make them deeper. The result will be loss of alveolar bone and finally loss of teeth if complete treatment is not instituted.

Many dentists use escharotics in the treatment of these lesions; this treatment is contraindicated because the disease process is one of necrosis with sloughing of tissue cells. If escharotics are superimposed on this process, the result is an increase in the loss of interdental tissues. All liquid escharotics cause a slough of the lesion and of the adjacent tissue as well, because surface tension carries the liquid around the tooth. If it is necessary to recontour the gingiva, it is suggested that it be done by surgical gingivectomy which allows the operator to control the amount of tissue removed.

SUMMARY AND CONCLUSIONS

In this study of necrotizing ulcerative gingivitis, 56 patients were treated alternately. Of the 33 patients treated with penicillin troches (1,000 units, one every two hours), 31 were cured, but 2 patients with gingival flaps over partially erupted third molars failed to respond to the treatment. In the control group that received placebo troches and no drugs, 22 of the 23 patients were cured by curettage, prophylaxis and home care. The one failure to effect a cure resulted from a complete lack of cooperation in interdental brushing and massage.

In this study necrotizing ulcerative gingivitis was not self-limiting and did not heal without treatment. Although the epithelium clinically appeared to be healed after completion of treatment, the biopsies demonstrated that this was not always true. In a few cases the epithelium had not regenerated completely and microscopic breaks were present, so that the connective tissue was exposed. In the pilot study, penicillin relieved the symptoms more effectively than neoarsphenamine, oxophenarsine hydrochloride or hydrogen peroxide.

Penicillin is an aid to treatment because it relieves the symptoms readily and shortens the period of treatment; however, the disease can be cured without drugs by thorough curettage, prophylaxis and conscientious home care. Drugs are, at best, only an adjunct to treatment.

Leisure • Leisure, it must be clearly understood, is a mental and spiritual attitude—it is not simply the result of external factors, it is not the inevitable result of spare time, a holiday, a week-end or a vacation. It is, in the first place, an attitude of mind, a condition of the soul. *Josef Pieper, "Leisure, the Basis of Culture."*

A type of pain associated with the restoration of teeth with amalgam

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The problem of postoperative pain after the insertion of amalgam fillings has been mentioned by many writers in the dental literature. This article is concerned with a specific type of pain associated with the restoration of a tooth with amalgam.

It is a sharp, lancinating pain, the onset of which is severe and without warning. The pain lasts from several seconds to a few minutes, radiating from the area of a tooth which has been filled with amalgam from one day to three weeks earlier. This type of pain is not associated with deep caries causing pulpitis, with thermal shock due to the metallic nature of the restoration or with the irritating nature of the cement base.

Inquiries into the activities of patients at the moment of the sharp onset of the pain show that these activities have no relation to the occurrence of the pain, that the patients are not putting pressure on the tooth as in chewing, in eating sweets or in similar activities. The patients cannot voluntarily produce the pain.

Patients sometimes have difficulty in locating the tooth which is painful although they know the general region of the pain. Teeth which have reacted in this manner appear normal when tested by thermal tests, electric pulp tests and percussion. These tests, therefore, are not of great value in locating the offending tooth. The most significant observation is a new amalgam filling in the region. It must be noted that neither the location nor the size of the filling has importance. If there has been only one amalgam filling placed in the section indicated by the patient, then suspicion falls on it. If, however, there have been several placed within the time indicated, then determination of the one or more which are causing pain becomes a problem.

After the first stab, the pain gradually diminishes in a pulsating manner and goes away in an hour or so, to be repeated at intervals of several hours to several days. The later attacks are less severe and become spaced further apart in time until they no longer occur.

This phenomenon was first described by Romnes and Skinner[1] in 1938 and has subsequently been mentioned by many writers on amalgam. It has never been observed with any filling material other than amalgam but has been observed with several different brands of alloy, all of which meet the A.D.A. specifications.

Although amalgam has been in use for more than 125 years,[2,3] Romnes and Skinner[1] describe this particular type of

1. Romnes, Arne F., and Skinner, E. W. Report of a study concerning post-operative pain following restoration with amalgam. Northwest. Univ. Den. Res. & Grad. Quart. Bul. Feb. 7, 1938, p. 19.

2. Lane, J. R. Survey of dental alloys. J.A.D.A. 39:414 Oct. 1949.

3. McGehee, W. H. O.; True, H. A. and Inskipp, E. F. A textbook of operative dentistry, ed. 3. Philadelphia, Blakiston Co., 1950, p. 409.

pain as being of fairly recent occurrence and consider this late appearance as one of the striking features of the phenomenon, which is now known to be associated with amalgam fillings contaminated with moisture.[4-11] In this article the phenomenon is termed the amalgam reaction.

AMALGAM IN RESTORATIVE DENTISTRY

Amalgam is held in high regard by the dental profession as a filling material. Hollenback[12] considers amalgam superior to the gold inlay and inferior only to gold foil. Healey and Phillips[13] in their study of 1,521 cases of amalgam failure do not consider the material at fault. Manley[14] in investigating the reaction of pulps of the teeth of dogs to various filling materials found the reaction to amalgam to be "not sufficiently severe to cause any serious or immediate damage to the pulp tissue." Of the four filling materials he used, zinc oxide and eugenol, silicate cement, amalgam and germicidal cement, only zinc oxide and eugenol produced less reaction.

These facts are reflected empirically in the wide use which amalgam enjoys. Brekhus and Armstrong[15] point out that amalgam is the most frequently used material in restorative dentistry and that there is a lower percentage of failure with it than with any other material. Schoonover and Souder[4] state that "more restorations are made from amalgam than from all other materials combined."

The number of restorations made of amalgam yearly is tremendous. The Surgeon General's Office stated that 68,170,326 permanent fillings were made by Army dentists during the period December 7, 1941, to September 1, 1945, and that most of them were amalgam.[16] A poll of dentists elicited the information that the greatest single share of the dentist's time is "consumed" by amalgams.[17]

Investigations into the nature of the set amalgam and the alloy continue.[18] Understanding of the reasons for the behavior of amalgam is increasing but is still not complete. The decade from 1940 to 1950 saw some great strides made in the direction of full comprehension of the complex nature of the amalgam filling and its proper manipulation.

The common practice of mulling the amalgam in the palm of the hand during the course of the mixing was shown to do more harm than good. For years it had been thought that mulling produced a smoother and more workable mass which could be adapted to the cavity walls with greater accuracy and thus produce a better filling; but during this decade it was shown that this practice might incorporate perspiration into the mix and that this perspiration, because of its chemical constituents, especially water, produced undesirable properties in the set amalgam.

4. Schoonover, I. C., and Souder, Wilmer. Research on dental materials at the National Bureau of Standards. N. B. S. Circular 497. Washington, D. C., U. S. Government Printing Office, Aug. 15, 1950.

5. Ray, K. W. Perspiration ruins amalgam. Hand-mulling may produce faulty fillings. D. Survey 18:1326 Oct. 1942.

6. Schoonover, I. C.; Souder, Wilmer, and Beall, J. R. Excessive expansion of dental amalgam. J.A.D.A. 29:1825 Oct. 1942.

7. Kornfeld, Benjamin. Successful amalgam restorations. J. D. Soc. New York 11:69 March-April 1945.

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9. American Dental Association, Council on Dental Research. Effects of contamination of amalgam with moisture. J.A.D.A. 37:239 Aug. 1948.

10. American Dental Association, Research Commission. Excessive expansion of amalgam. J.A.D.A. 29:292 Feb. 1942.

11. Moisture spoils amalgams. Editorial. J. Am. Col. Den. 9:331 Sept. 1942.

12. Hollenback, George M. Physical properties of filling materials. J.A.D.A. & D. Cosmos 24:1080 July 1937.

13. Healey, H. J., and Phillips, R. W. Clinical study of amalgam failures. J. D. Res. 28:439 Oct. 1949.

14. Manley, E. B. A preliminary investigation into the reaction of the pulp to various filling materials. Brit. D. J. 60:321 April 1, 1936.

15. Brekhus, P. J., and Armstrong, W. D. Civilization —a disease. J.A.D.A. 23:1459 Aug. 1936.

16. Roper, L. H. Restorations with amalgam in the army: an evaluation and analysis. J.A.D.A. 34:443 April 1, 1947.

17. Alloy fillings consume the greatest single share of dentists' time. D. Survey 25:1643 Nov. 1949.

18. Strader, K. H. Amalgam alloy: its heat treatment, flow, mercury content and distribution of dimensional change. J.A.D.A. 38:602 May 1949.

REVIEW OF THE LITERATURE

In 1941 it was pointed out by the Research Commission of the American Dental Association[8] that manipulating amalgam with palms and fingers moist with perspiration contaminates it and produces restorations which behave normally at first, giving near normal expansion during the first day, but which continue to expand until this expansion reaches about 100 microns per centimeter on the twelfth day. Also observed was the fact that adding a drop of sodium chloride solution gave almost the same result.

It was then that Worner[19] suggested that

> The changes are so great as to point to some physico-chemical reaction between one or other of the metallic components of the amalgam and sodium chloride, giving a reaction product with a larger volume than the original reactants.

Schoonover, Souder and Beall[6] in a valuable paper on this subject suggested that a good grade of amalgam has a slight "beneficial" expansion of about 8 microns per centimeter during the first 10 to 24 hours after amalgamation. The American Dental Association in its specifications for dental amalgam allows a range of expansion of 3 to 13 microns per centimeter during this period.[20, 21] Normally, amalgams continue to expand for months after amalgamation; however, this variation is so slight as to have no clinical significance. Schoonover, Souder and Beall[6] measured expansions in normal amalgams which after more than three months had not exceeded the limits set by the specifications just cited, that is, 13 microns per centimeter.

They found that during this same period expansions of 300 to 400 microns per centimeter had developed in amalgams which had been contaminated with moisture. This expansion usually began developing after a period of two to seven days of dimensional stability and continued over a period of many months. Sweeney[22] states that this expansion continues indefinitely. In 1942 Schoonover, Souder and Beall[6] termed it "delayed expansion" to differentiate it from other known types of excessive expansion such as those caused by excess mercury, undertrituration and the composition of the alloy.

Amalgams to be tested were mixed in an amalgamator, then packed into steel dies. It was found that moisture incorporated into the amalgam whether in the form of distilled water, perspiration or saliva caused the delayed expansion; that the presence of sodium chloride accelerated the process; and that alloys which do not contain zinc do not produce this delayed expansion even in the presence of sodium chloride and moisture.

Expansions of this extent, wrote Schoonover, Souder and Beall in this work, concern the dentist, for they might cause the extrusion of the amalgam beyond tooth margins or, if undercuts are used, could cause painful disturbances of the pulp because of the pressure developed.

The concept that the pressure of the filling material on the pulp causes pain is not new. Harper[23] cautions that pressure against the pulp developed during the packing of an amalgam always remains as a pulp irritant and proposes the placing of a cement base without pressure to permit the amalgam to be tolerated better. Romnes and Skinner[1] re-

19. Worner, H. K. Excessive expansions in dental amalgams. Hand mulling shown to be a cause. Austral. J. Den. 45:161 July 1941.

20. Taylor, N. O. Amalgam technic, dependable and dangerous practices. J.A.D.A. 17:1880 Oct. 1930.

21. McGehee, W. H. O.; True, H. A., and Inskipp, E. F. A textbook of operative dentistry, ed. 3. Philadelphia, Blakiston Co., 1950, p. 417.

22. Sweeney J. T. Manipulation of amalgam to prevent excessive distortion and corrosion. J.A.D.A. 31:375 March 1944.

23. Harper, William E. Unless properly manipulated, amalgam is a eutectic mixture alloy, worthless as a permanent filling material. Austral. D. Summary 8:502 March 1928.

late the pain phenomenon they describe to that of overcondensed gold foil which produces pressure on the pulp and thus pain.

Schoonover and Souder[24] found that amalgams sometimes showed blistering of their surfaces. This blistering was explained[6] as caused by the formation of gas within the filling as the result of galvanic corrosion. The possibility that the observed "delayed expansion" was caused by galvanic action was, therefore, investigated.[6] This proved to be the case, and large quantities of gas were shown to be contained within these amalgams. The gas was shown to be hydrogen; determinations of its pressure within the alloy showed it to be between 1,600 and 2,200 pounds per square inch.

The hydrogen is said to be formed by the dissociation of moisture into its components in amalgams containing zinc. The contaminated amalgam contains the required components of an electrolytic cell. The liberated hydrogen swells the amalgam while the oxygen probably combines with the metals in the set amalgam.[9]

Schoonover, Souder and Beall[6] concluded therefore that the characteristic delay in the development of expansion could be explained by their data. They were of the opinion that the period of inactivity of from two to seven days could be accounted for by the assumption that during this period the gas pressure was insufficient to cause the amalgam to flow. They suggested further that the delay in development of the characteristic pain could be explained by delay in development of the excessive expansion.

McGehee and his co-authors[25] point out that most amalgams flow under constant pressure and that crushing strength and flow are relative factors; that when the load is applied suddenly, crushing strength runs high; that when it is applied continuously, it is greatly diminished. Thus most amalgams tested after 48 hours showed crushing strengths of over 32,000 pounds per square inch when crushed quickly, usually in about three minutes. In flow tests made after 48 hours, however, it was shown that 1/10 the load, 3,200 pounds, maintained constantly, produced crushing in most of the specimens in 20 hours.

If loads of 3,200 pounds per square inch produced crushing in 20 hours, it is clear that loads of 2,000 pounds per square inch could cause considerable distortion.

Schoonover and Souder[4] summed up the situation thus:

> It was proved that a small amount of water incorporated into the amalgam during the mixing or placing of the restoration reacts with the zinc in the alloy to produce hydrogen. The entrapment of the hydrogen within the restoration creates pressures sufficient to expand the alloy against the underlying tooth structures, causing severe post-operative pain. As a result of this discovery, techniques were developed that make it possible to eliminate entirely this type of failure. The extremely painful experiences suffered by thousands during the third to tenth day after an amalgam filling has been placed are no longer necessary if the dentist handles the amalgam with the proper care.

Another direction has been suggested for the elimination of corrosion and expansion in contaminated amalgams. McCauley[26-30] has frequently maintained that the utilization by the profession of zinc-free amalgam alloys would eliminate

24. Schoonover, I. C., and Souder, W. Corrosion of dental alloys. J.A.D.A. 28:1278 Aug. 1941.

25. McGehee, W. H. O.; True, H. A. and Inskipp, E. F. A textbook of operative dentistry, ed. 3. Philadelphia, Blakiston Co., 1950, p. 415.

26. McCauley, C. M. What shall we do about palm contamination? J. South. California D. A. 10:9 March 1943.

27. McCauley, C. M. Petrous portion of the temporal bone vs. amalgam. J. South. California D. A. 11:11 April 1944.

28. McCauley, C. M. Moisture-zinc contamination in amalgam. J. South. California D. A. 11:9 Nov. 1944.

29. McCauley, C. M. Amalgam briefs. Laboratory tests vs. clinical observations. J. South. California D. A. 12:8 Jan. 1945.

30. McCauley, C. M. Indictment of contaminated amalgam. J. South. California D. A. 13:12, 42 July 1946.

the danger of expansion of the amalgam, its resultant extrusion from the cavity margins and the subsequent recurrent caries but would retain the advantage of hand mulling to complete the mix and give it the proper consistency.

This idea has not been accepted by the dental profession. Alloys containing zinc have some advantages which make them better suited to dental practice than nonzinc alloys, and it is pointed out that contamination of nonzinc alloys may yield other undesirable effects besides delayed expansion.[6]

The problem of excessive corrosion of amalgams also concerned the investigators of this period. Schoonover and Souder[34] pointed out that amalgams may corrode whether in contact with another metal or not and even if there is no other metal in the mouth. Ray[5] wrote that the contamination of an amalgam by the introduction of moisture of any kind either during mixing or packing produces a filling which expands excessively and corrodes badly. In cases of gingival fillings, he says, the excessive expansion by causing downward pressure on the pulpal wall gives rise to sharp pain.

These pains he termed "amalgam shock"[5] and described them as occurring from one to several weeks after the restoration is made. In singling out the gingival filling, he followed the suggestion first made by Romnes and Skinner who also considered this region as the most frequent offender.

AMALGAM FILLINGS AND GALVANIC ACTION

The existence of galvanic action and galvanic currents in the mouth has been discussed for years.[31] In 1940 Lain, Schriever and Caughron[32] wrote that there appeared at that time to be almost unanimous agreement on these factors: (1) that human saliva constitutes a good electrolyte, (2) that in every oral cavity containing dissimilar metals exist all the elements for galvanic cells and (3) that certain symptoms and pathologic lesions in the mouth diagnosed as electrogalvanic lesions disappear after complete and correct replacement with certain metals.

Tingley,[33] relative to this matter, stated that there are individuals whose histories disclose that amalgam approximating gold in any form may cause discharges which give rise to unpleasant symptoms. He was of the opinion that amalgam has a "genetic galvanic action" and that it should, therefore, not be used in certain places.

Investigation into this subject until recently was concerned with the effects of different metals in the mouth on the mucous membranes in the production of painful and possibly serious disturbances.[34, 35] An excellent bibliography on this subject appears in a recent article by Schriever and Diamond.[36]

Schoonover and Souder[34] investigated the rate of corrosion of dental alloys under various conditions and stated:

> One has only to examine the surface and base of many amalgam fillings to observe corrosion, which is probably the result of galvanic action. Such amalgams need not be in contact with another metal or in mouths containing additional metal fillings.

In another part of the article they wrote:

> Galvanic action on a single metal filling may also result from exposure of different

31. Patrick, John J. R. Oral electricity and the new departure. D. Cosmos 22:543 Oct. 1880.

32. Lain, E. S.; Schriever, William, and Caughron, G. S. Problem of electrogalvanism in the oral cavity caused by dissimilar dental metals. J.A.D.A. 27:1765 Nov. 1940.

33. Tingley, H. E. The clinical use of amalgam. D. Items Interest 62:608 July 1940.

34. Thoma, K. H. Oral pathology, ed. 2. St. Louis, C. V. Mosby Co., 1944. p. 1153.

35. Galvanic glossitis. Editorial. New York J. Den. 11:7 Jan. 1941.

36. Schriever, William, and Diamond, L. E. Electromotive forces and electric currents caused by metallic dental fillings. J. D. Res. 31:206 April 1952.

areas of the filling to solutions that are not chemically the same. Such a condition produces a simple concentration cell, which in dental practice would be found where an amalgam restoration fails to seal the cavity. The base of such an amalgam would be exposed to a solution of a different concentration, for example of oxygen, from that in contact with the surface.

Schriever and Diamond[36] outline another way in which a single filling within the mouth may act to produce a galvanic current. They describe the filling as being a single metal between two electrolytes, in contact externally with the saliva and internally with the fluids of the tooth, bone and tissues, which they call the "bone fluid." Since these two fluids are, in turn, in contact with each other through the tissues, the requirements for a "liquid junction cell" are fulfilled. An electric current exists in that circuit, passing through the metal and through the electrolytes.

In a mouth with more than one filling, each would act in this manner and in addition would be in contact with the other metallic fillings externally through the saliva and internally through the "bone fluid." Thus, there would be internal and external circuits.

There are other ways also in which a single amalgam filling may produce galvanic cells. It is pointed out by Strader,[18] Lane[2] and Harper[37] that different parts of the same filling are different "metals." The amalgam filling may be described as a complicated crystalline mass made up of different combinations and forms of the metals comprising it. This complex mixture is bathed in saliva, an adequate electrolyte. Thus, it is possible that different areas of the surface of the filling may act as anode and cathode with the saliva as electrolyte.

The production of galvanic currents through the interaction of a single metal filling with the other constituents of the mouth and the surrounding parts is a phenomenon which has not been understood until recently.

SUMMARY OF FACTS ALREADY KNOWN

1. Histological studies show that amalgam is nonirritating to pulp.
2. Pain is sometimes observed after insertion of amalgam fillings.
3. Prior to about 1936, there was no report of this type of pain.
4. It is generally agreed that this pain is of a certain type and occurs postoperatively within a certain period.
5. Observations on amalgams contaminated with moisture, perspiration or sodium chloride solution show expansions far in excess of normal or desirable range, formation of hydrogen gas and considerable corrosion.
6. The literature explains this type of postoperative pain as due to the expansion of the amalgam and to the resultant pressure on the pulp through the resilient dentin.
7. There is galvanic action within the filling.

CLINICAL INVESTIGATION AND OBSERVATIONS

When this reaction was first noticed by the writer, it was thought that some pathologic condition of the pulp might be causing it. Removal of the filling and the base, therefore, and examination of the cavity for exposure or near-exposure was the routine procedure.

An attempt was made to eliminate all known pain-producing factors. If a tooth had a deep cavity or there was a possibility that the reaction was due to pulp irritation on account of infection, manipulation or any of the known sequelae of cavity preparation, the case was not considered typical. In the typical case nothing was found to implicate the pulp. In general, one-surface fillings, either

37. Harper, William E. Amalgam failures. Where is the fault: in the alloy or in the operator? Dominion D. J. 40:153 May 1928.

occlusal or gingival, where the entire cavity outline was clearly visible were used for study.

After the removal of the filling, the tooth was filled with zinc oxide and eugenol cement and not disturbed for from two weeks to several months. The pain never occurred while the tooth was in this condition; the tooth was comfortable. The amalgam was replaced; a base of zinc oxide and eugenol was left.

In replacing the amalgam, the same technic of mixing and handling was used as for the first filling. The mercury-alloy ratio was established by weighing in a balance. The mix was triturated with a mortar and pestle and then mulled in the hand.

The pain recurred frequently. It seemed clear that the amalgam caused the pain. As new instances of the amalgam reaction occurred and there were recurrences of former instances, relief was given the patients by removing only the amalgam, replacing it with zinc oxide and eugenol or with zinc oxyphosphate cement. As expected, the pain did not occur when the tooth was in this condition.

A method was now sought to stop the pain in the presence of amalgam. It was thought that reducing the mass of the amalgam layer might have an effect. Two methods were devised for achieving this end: the elimination of amalgam substance internally and externally.

To reduce the mass of amalgam from the inside, a very shallow preparation was made so that the maximum of cement thickness was left; then a thin amalgam was placed. This procedure did not eliminate the pain in all instances.

In reducing the mass of amalgam from the outside, enough substance was removed to thin the filling without exposing the dentinoenamel junction or the dentin.

When the pain recurred in teeth which had been treated by the first procedure, the attempt to make the tooth comfortable necessitated removing the amalgam. In teeth which had been treated by removal of a superficial layer of amalgam, the pain occurred with about equal frequency. Since these teeth were sensitive to manipulation during or immediately after a painful episode, the minimum of operative procedures was thought advisable. Therefore, in each case the space from which the amalgam had been removed was washed with alcohol, dried and sealed by carefully teasing a layer of thin zinc oxyphosphate cement to its margins and contours to see if this would give some relief.

When this layer of cement was placed over the amalgam, the patients immediately reported that the pain was diminished. Within a few minutes these teeth were usually reported to be completely comfortable.

A factor which changes when a superficial layer of amalgam is removed and replaced with cement is the environment of the rest of the amalgam filling in relation to the saliva. Drying of the amalgam filling was, therefore, attempted during the reaction to see if this would relieve the pain; but the results were not clear.

A method of maintaining dryness was resorted to: the filling and tooth margins were carefully dried and coated with several layers of cavity varnish.

When this was done, it was found that even with the pain at its greatest intensity complete relief was almost immediate. Repeated trials on different teeth showing the amalgam reaction were made; and in every case, even when the patient was treated during the most acute phase, the pain was quickly relieved.

While relief is immediate and complete when the involved tooth is treated as described, this relief is a palliative measure. The pain does return after the varnish coating wears off.

CONCLUSION

Schoonover, Souder and Beall[6] have shown that an amalgam containing zinc

expands excessively if contaminated with moisture and that this process continues in the laboratory for months. From this it may be concluded that the amalgam so contaminated contains all the elements necessary for the development of this expansion. These writers have suggested that the development of this expansion "may also account for the cases of post-operative pain often reported from two to seven days after a filling is completed."

It can be shown, however, that when a filling is causing this pain, coating it with cavity varnish will stop the pain. Since the experiments reported by these writers[6] would lead to the conclusion that the amalgam, when isolated from the saliva, continues to expand, it must be concluded also that cessation of the pain is not caused by cessation of the expansion and that therefore the expansion does not cause the pain.

This conclusion is in accord with the observation that placing a thick layer of cement under a relatively thin amalgam does not have the effect on the pain that it would be expected to have.

There are other aspects of this type of pain which are not adequately explained by the theory that the pain is caused by expansion. If the expansion is steady and gradual, it is difficult to understand why the pain should be lancinating in nature. If excessive expansion of the delayed type causes the pain, then is it not logical that the other types of excessive expansion should cause this or a similar type of pain? The explanation of this reaction as due to excessive expansion of the amalgam filling does not satisfy all the clinical observations.

The only hypothesis which conforms with the observed facts is that this type of pain is due to an electrical phenomenon in which the filling produces enough electrical energy to produce the pain in the tooth. Apparently these bursts of electrical energy through the tooth take place intermittently and thus produce the type of pain which is described by the patient.

Coating the filling with cavity varnish or removing a thin layer of amalgam and replacing it with cement, in short, interrupting the continuity of the electrical circuit, stops the pain.

The internal circuit through the "bone fluid" is apparently not the critical one. Schriever and Diamond[36] found that the greatest potential differences existed when the teeth being measured were wet with saliva. It may be concluded, therefore, that in this condition the most galvanic action exists in the whole system. By drying and coating the tooth, enough resistance is introduced into the external circuit to stop the action within it. The electromotive force as well as the current which the entire circuit can develop is thus reduced. The internal circuit apparently is not, in itself, capable of provoking the reaction.

Another assumption, based on the first, which must be made in order to explain the nature of this pain and the manner in which it occurs, is that the fillings not only act as electrolytic cells producing electrical energy but also store this energy in a manner similar to a condenser. When the charge in this condenser reaches proportions large enough to overcome the resistance of the dielectric, discharge takes place rapidly and causes the acute episode of pain.

These are the only hypotheses which fit the observed picture. It must be concluded that this pain is caused not by expansion but by an electrical phenomenon.

DISCUSSION

The pain described in this paper as being due to an electrical phenomenon has been called by the writer the "amalgam reaction." This term sums up the reaction and indicates that it is the amalgam and not the tooth which is reacting, that the tooth is painful in response to the

changes going on within the filling.

It is realized by the writer that there are many questions raised by this observation which are unanswerable at the present time. It is not known, for instance, why all contaminated amalgams do not produce the amalgam reaction nor is it known what is peculiar to those that do. It is not known why this reaction made its appearance only recently.[1] It is not known why only contaminated amalgams produce this reaction, since there is evidence to show that uncontaminated amalgams as well as contaminated amalgams have an electromotive force.[36] It may be that uncontaminated amalgams do not act as condensers and that this is the only difference between the two. It is not known why the attacks eventually stop and the pain no longer recurs.

The amalgam reaction is associated only with a tooth which has been filled recently. The patient who is subjected to this unpleasant development is often disturbed and apprehensive as to the future of the tooth and is suspicious of the operator's judgment in having filled it. Often the patient feels that relief can be had only through extraction and regards with even greater doubt the operator's assurances that the tooth is basically sound. It is extremely likely that many teeth have been extracted after they have reacted to amalgam in this manner. Understanding of this phenomenon will do much to dispel the questions and doubts in the minds of both the patient and the operator.

The lancinating nature of this pain and its sometimes vague point of origin make understanding of it valuable to the oral surgeon who should be able to differentiate it from the sharp pains of neuralgia and similar conditions.[38]

In view of the complexity of the reactions within the contaminated amalgam as well as the potentialities for discomfort, the exclusion of moisture from amalgam is of utmost importance. The procedure of choice in the light of present-day understanding of the best methods for manipulating amalgam excludes touching it with the fingers.

When a tooth with a relatively recent amalgam filling is reacting in the manner described, it may be assumed that the amalgam has been contaminated with moisture. While relief may be afforded the patient by coating the filling, definitive treatment requires the removal of the amalgam and its replacement with one which is not contaminated.

In those cases where for one reason or another the filling cannot be removed, relief is sometimes afforded the patient by carefully polishing the amalgam. There is a possibility that a small amount of saliva may soak into the incompletely set filling on its exposure to the fluids of the mouth and that this may produce some discomfort.

The development of a surface, electrochemically more stable, is another benefit to be derived from polishing amalgams, for when a superficial layer is planed off and the surface area reduced by removing irregularities, a smaller area of amalgam is in contact with the saliva.

Occasionally teeth are slightly sensitive immediately after the insertion of an amalgam filling, even in the absence of contamination. Relief from this pain also may be given the patient by coating the amalgam with cavity varnish. In fact, it would not be harmful if all amalgam fillings were dried and coated with cavity varnish before the patient is dismissed. By this means amalgam fillings with more stable surfaces would be produced.

SUMMARY

A type of dental pain first described by Romnes and Skinner and associated with an amalgam restoration which is con-

38. Harrigan, W. F. Facial pain. Oral Surg., Oral Med. & Oral Path. 5:563 June 1952.

taminated with moisture is caused by an electrical phenomenon within the amalgam filling, wherein the filling acts as both battery and condenser. The single tooth acts as both anode and cathode of this galvanic cell, and the saliva with or without the "bone fluid" acts as the electrolyte. There are several ways in which the tooth can act as the cell. The tooth must be capable of acting as a condenser if the nature of this type of dental pain is to be explained.

This reaction when it occurs can be stopped in several ways: (1) palliatively by drying the tooth and coating it with cavity varnish or collodion, (2) palliatively by removing a superficial layer of the filling and replacing it with cement, (3) definitively by removing and replacing the amalgam filling with one which is not contaminated with moisture.

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The preventive role of occlusal balancing of the natural dentition

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More teeth are lost because of periodontal disease than because of caries.[1,2] There is a great deal of data in the literature to substantiate this statement, and many practitioners have observed this clinically. It is essential that the recognition, diagnosis and treatment of periodontal disturbances become more routine than is now the case. A better understanding of the causative factors involved would result in earlier and more thorough treatment, and often in the prevention of periodontal disease. Despite all the progress made in dentistry, the treatment of diseases of the periodontal structures is still in doubt. Many dentists sincerely believe that the only cure for periodontal disturbances is the extraction of teeth. The emphasis in dental practice is on the art of repair of carious teeth and the replacement of missing teeth, too many of which have been lost needlessly.

What can be done to prevent the appalling loss of teeth from periodontal disease? The dentist should have a comprehensive idea of the cause and effect of these diseases and also be able to translate his knowledge into practical application.

Broadly speaking, the causes of periodontal disease can be grouped as follows: irritation, hyperfunction, hypofunction and systemic factors.[3]

1. Robinson, H. B. G. Periodontal disease. In A textbook of oral hygiene and preventive dentistry, Bunting, R. W., and others. Philadelphia, Lea & Febiger, 1950, p. 95-128.

2. Allen, E. F. Statistical study of the primary cause of extractions. J. D. Res. 23:453 Dec. 1944.

3. Kronfeld, R. Histopathology of the teeth, ed. 2. Philadelphia, Lea & Febiger, 1945.

Among these, irritation and hyperfunction are responsible for the vast majority of periodontal disorders. The role that irritation plays is universally recognized and its importance is understood. The role of hyperfunction, unfortunately, is not as well understood.

HYPERFUNCTION AND PERIODONTAL DISEASE

The effect of hyperfunction is of great importance because increase of pressure and, to a lesser degree, increase of tension beyond the limits of physiologic tolerance lead to resorption of bone by increased osteolastic activity.[4] This is evidenced clinically by traumatic crescents, congestion of the marginal gingivae, McCall's festoons, Stillman's clefts, recession of the marginal gingival line, epithelial nodules and varying degrees of mobility of teeth. There are characteristic roentgenographic signs which appear before clinical changes can be observed. These signs are alterations in the width of the periodontal membrane space, thickening of the lamina dura, rarefaction, condensation and root resorption.[5]

Hyperfunction is brought about in several ways. Teeth often are so aligned that they do not meet with equal force, hence they do not wear evenly. Civilized diets do not provide the tough, fibrous foods that would necessitate more vigorous mastication which would result in a more desirable wearing or milling of teeth. Those teeth which are left relatively unworn will, of course, receive a greater amount of pressure than the others. It must be recognized, however, that not all cases of occlusal imbalance result in damage to the supporting structures. If this were so, hyperfunction would more frequently cause undesirable changes. Many individuals with occlusal imbalance show little or no evidence, roentgenographically or clinically, of damage to the periodontium. As a matter of fact, in many situations the periodontal structures respond to overfunction by becoming stronger and denser; a given amount of irritation will not evoke the same reaction in all individuals. This has been variously referred to as the "resistance factor" or "bone factor."[6] The combined effect of local and systemic factors determines the amount of inflammation in the gingival and periodontal structures and osteoclastic resorption of alveolar bone.

BONE FACTOR

If the "bone factor" at a given time is good, the supporting structures will resist trauma, and the tooth or teeth in question will remain firm until excess function wears them down sufficiently to equalize pressure. If, however, the "bone factor" is relatively poor, the supporting structures weaken before enough wear takes place to reduce the amount of occlusal trauma, the lateral stresses become too great for the periodontium to withstand and the teeth become mobile. As this occurs, the leverage from lateral stress becomes greater and the supporting structures are progressively less able to withstand the increased occlusal trauma.

It is important that it be understood that the "bone factor" is not constant. A given amount of occlusal stress which is not traumatic for a younger person or for one in a relatively good state of health may at another time become actual occlusal trauma. That is why it is of paramount importance that potential trauma be considered as well as actual trauma, and balancing should be done not after the damage has already occurred, but the damage should be anticipated and necessary corrections should be made before such damage takes place.

4. Weinmann, J. P., and Sicher, H. Bone and bones. St. Louis, C. V. Mosby Co., 1947.
5. Miller, S. C. Textbook of periodontia, ed. 3. Philadelphia, The Blakiston Co., 1950.
6. Glickman, Irving. Clinical periodontology. Philadelphia, W. B. Saunders Co., 1953.

If the dentist is sufficiently aware of occlusal trauma and its effect and the balancing of occlusion becomes a routine procedure with him, potential trauma will not become actual trauma and thus the destruction of periodontal structures will be prevented.

OTHER CONSIDERATIONS

There are three additional reasons why it is important that preventive occlusal balancing of the dentition be utilized. These reasons, stated briefly, are as follows:

1. Efficiency of mastication is increased because of more complete function between cusps and inclined planes of the teeth.

2. Temporomandibular joint disturbances may be prevented or corrected. A seemingly insignificant premature contact is of greater importance etiologically than is a complete closure of the bite.[7] Many forms of bruxism, acquired centric relations, disharmony between condylar inclinations and occlusal paths, and spasticity of the masticatory musculature may be produced through a premature contact.

3. Esthetics may be improved, particularly if a protrusive imbalance is corrected.

OCCLUSAL TRAUMA

There are many definitions of occlusal trauma, most of which are concerned with actual damage to the periodontal structures. A better definition has been given by Kerr:[8] "The condition where injury is or may be produced in the teeth, their supporting structures, the jaw or its articulation by the act of bringing the teeth into complete occlusal contact." This definition is acceptable because it takes into consideration the possibility of damage not only to the periodontium and teeth but to the temporomandibular joint as well. It also stresses potential as well as actual trauma.

OBJECTIONS TO OCCLUSAL BALANCING

Several objections have been made to occlusal balancing. These objections are raised because of the possibility of closure of vertical dimension, the danger that teeth may be taken out of centric contact, or because of the sensitivity of teeth.

It is possible to balance occlusion without permitting closure of vertical dimension and without taking teeth out of centric contact. It is essential that these two errors not occur. If close attention is paid to fundamental principles, successful balancing can be done without changing vertical dimension or centric contacts. Sensitivity of teeth sometimes persists, but when this occurs, treatment of the hypersensitive surfaces with sodium fluoride, zinc chloride or other drugs will bring relief.

ESSENTIAL PRINCIPLES

It is impossible in this paper to give a complete description of the technic of occlusal balancing. There are many excellent treatises on the subject.[8-10] Certain of the essential principles can be mentioned briefly.

1. The patient's jaws must be in centric relation. Centric relation may be defined as the most retruded position of the mandible from which lateral excursions can be made. A mandibular retruder is of value in determining whether the patient has an acquired centric relation, provided care is taken not to use too

7. Sicher, H. Personal communication.

8. Kerr, Donald A. Traumatic occlusion. In A textbook of oral hygiene and preventive dentistry. Bunting, R. W., and others. Philadelphia, Lea & Febiger, 1950, p. 129-151.

9. Schuyler, C. H. Fundamental principles in the correction of occlusal disharmony, natural and artificial. J.A.D.A. 22:1193 July 1935.

10. Shore, N. A. Equilibration of the occlusion of the natural dentition. J.A.D.A. 44:414 April 1952.

much force and over-retrude the mandible.

2. Premature contacts on the teeth must be corrected in centric, right and left lateral and protrusive relations. If a tooth is in premature contact in both centric and eccentric relations, the cusp of the interfering tooth must be ground. If the tooth is in premature contact in centric relation only, the fossa of the opposing tooth should be deepened. If the tooth is in premature contact in eccentric relation only, the guiding inclined plane of the opposing tooth should be ground.

3. In grinding, harmonious relations between opposing teeth should be established.

4. In correcting the working bite, the balancing bite on the opposite side should be watched to be certain there is no interference.

5. Freedom in centric relation should be provided. The teeth must not be allowed to remain locked in centric position.

6. When posterior teeth have deep inclined occlusal planes, a shallower inclination should be established.

SUMMARY

The dental profession should be more aware of the importance of periodontal disease. Not enough emphasis has been placed on the causative factors involved in periodontal disturbances, and too many dentists have developed, for one reason or another, a fatalistic philosophy about periodontal disease which leads them to feel that treatment of the diseases of the supporting structures of the teeth is not worth while because teeth involved in periodontal disease eventually must be lost.

The recognition of the important role that occlusal balancing can and should play in the treatment and often in the avoidance of periodontal disturbances is essential to a successful rationale of periodontal care.

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Antibiotics • The word "antibiotic," in the present accepted sense, was redefined in 1942 to embrace the products of microorganisms that have an inhibitive or destructive effect upon the growth of other microorganisms. Beginning in 1939, a number of new compounds that had antimicrobial properties were isolated in rapid succession from cultures of bacteria, fungi, and actinomycetes. The isolation of gramicidin and tyrocidine in 1939 was followed by the reisolation of penicillin in 1940-41, by the isolation of actinomycin and of streptomycin in 1940-43, and later of numerous new compounds. Before 1940, the actinomycetes were known to possess antimicrobial properties, but only two preparations, of questionable importance as antibiotics, were recognized. At present, nearly 100 compounds and preparations are known to be produced by this group of organisms. These products comprise some of our most valuable antibiotics, and new ones are being added to the list constantly. *Selman A. Waksman, "The Changing Concept in Microbiology," The Scientific Monthly 76:129 March 1953.*

Organic constituents of enamel

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Recent studies have drawn attention to the likelihood that the organic matrix of enamel is involved at an early stage in caries. It has been assumed that this matrix is largely keratin, a substance expected to be resistant to bacterial enzymes. The process of destruction of the organic matrix can be observed by the refined histologic methods now available. Many excellent microphotographs of the intact organic material and of its appearance after modification by caries have been published. In all this work the aim has been to preserve the structure and configuration of the matrix as exactly as possible against the disruptive effects of demineralization.

Consideration of these studies prompted questions as to what the organic constituents of enamel might be, how much of each was present, and which of them were made visible by histologic methods. In answering these, it has become clear that data on only half the organic matrix of enamel have previously been available. Some of the properties of the remaining fractions have been studied in the course of the present investigations. Mention of these constituents has not previously been observed in the literature. Their modification by caries may be of great importance in determining the rate of progress of the lesion.

It has been said that a keratin-like substance accounts for the bulk of the 0.2 to 0.8 per cent organic matter now believed to be present in enamel.[1] In spite of the early references to the organic matter of enamel, it is only during the last 30 years that there has been general agreement that enamel contains any organic matrix. A number of attempts to determine the total organic content of enamel have been made over that period, but the reported values have varied according to the methods of preparation and determination adopted.

It has frequently been the practice to weigh the enamel before and after incineration, making a correction for the carbon dioxide driven off in order to arrive at the total amount of water and organic matter present. Less than 5 per cent of the weight lost during incineration is due to decomposition of the protein present, about 0.3 per cent of the enamel on the basis of nitrogen determinations.[2] The correction for carbon dioxide loss is not required when enamel is weighed before and after extraction with hot alkaline ethylene glycol, as favored by a number of workers, but other factors operate here against an accurate determination. Most of the dried enamel samples analyzed by both

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1. Schour, I., editor. Noyes's oral histology and embryology, ed 7. Philadelphia, Lea & Febiger, 1953.

2. Kariström, S. Physical, physiological and pathological studies of dental enamel. Stockholm, A.-B. Fahlcrantz, 1931.

methods[3] lost 4 per cent of their weight during incineration.

Nitrogen determinations are more satisfactory guides to the protein content of an enamel sample, but without a knowledge of the percentage of nitrogen in the protein or proteins of enamel, no precision can be expected of this method. It was calculated from nitrogen and carbon determinations on similar samples that 0.14 to 0.18 per cent protein was present in the enamel of boiled teeth.[4] Nitrogen determinations indicated the presence of a minimum of 0.49 per cent protein in one of several pooled samples of enamel prepared by the flotation method,[5] multiplying by the usual factor of 6.25, which is representative of typical proteins but not necessarily of the organic matrix of enamel. Allowing for the 0.6 per cent dentin present in these samples, the calculated minimum protein content would have been 0.37 per cent.

Enamel was separated mechanically from groups of bicuspid crowns[6] and the purity checked by showing that samples contained not more than 3 dentin particles in a count of 1,000 enamel particles. The observed nitrogen content centered on 0.077 per cent, which corresponds to 0.48 per cent protein on the basis mentioned earlier. An almost identical nitrogen content of 0.073 per cent was reported for "unstained enamel with few pits and grooves."[7] This was apparently the first instance of the isolation of the insoluble protein from relatively large amounts of enamel, although the same yields had been reported 20 years earlier from much smaller amounts.[8] "Enamel proper with pits and grooves ground out" yielded 0.21 per cent protein,[7] but more protein was isolated from samples involving the whole of the enamel or the interior and exterior layers, or those containing a higher proportion of pits, grooves and stains.

Cystine, methionine, phenylalanine and the basic amino acids were determined on samples prepared in this way.[7,9] Basic amino acids and cystine were also determined in the enamel protein residue resisting digestion with pepsin and chymotrypsin.[10] Other amino acids were identified qualitatively by paper chromatography of a hydrolyzate of this sample. A recent complete study of the amino acid composition of freshly isolated insoluble protein of enamel[11] revealed the presence of 5 per cent hydroxyproline, an amino acid which is characteristic of collagen. Amino acids not previously determined were assayed microbiologically; nitrogen represented by the values obtained for 20 amino acids accounted for 98 per cent of that present in the protein analyzed.

In addition to the information about the insoluble protein of enamel, there is some evidence in the literature on the existence of other organic components. A warning has been issued[12] that an acid-soluble fraction is lost to histological processing unless the end-point of demineralization is controlled carefully. In other experiments,[13] half the nitrogenous matter of enamel appeared in solution after demineralization with various acids. When unerupted molars were immersed

3. Bird, M. J., and others. A comparison between two methods of ashing enamel and dentin. J. D. Res. 27:693 Dec. 1948.

4. Sprawson, E., and Bury, F. W. Chemical investigation of the organic content of human enamel. Brit. D. J. 49:397 April 1928.

5. Deakins, M. L., and Volker, J. F. Amount of organic matter in enamel from various types of human teeth. J. D. Res. 20:117 April 1941.

6. Anderson, D. J. Nitrogen content of human dental enamel. Biochem. J. 45:31 Jan. 1949.

7. Losee, F. L., and Hess, W. C. Chemical nature of the proteins from human enamel. J. D. Res. 28:512 Oct. 1949.

8. Rosebury, T. Biochemical study of protein in dental enamel. J. D. Res. 10:187 April 1930.

9. Losee, F. L.; Neidig, B. A., and Hess, W. C. Basic amino acid content of enamel protein. J. D. Res. 29:815 Dec. 1950.

10. Block, R. J.; Horwitt, M. K., and Bolling, D. Comparative protein chemistry. Composition of the proteins of human teeth and fish scales. J. D. Res. 28:518 Oct. 1949.

11. Hess, W. C.; Lee, C. Y., and Neidig, B. A. Amino acid composition of enamel protein. J. D. Res. 32:585 Aug. 1953.

12. Frisbie, H. E.; Nuckolls, J. B., and Saunders, J. B. de C. M. Distribution of the organic matrix of enamel in the human tooth and its relation to the histopathology of caries. J. Am. Col. Den. 11:243 Sept. 1944.

13. Anderson, D. J. Personal communication, 1951.

in a butanol solution of ninhydrin,[14] the stained area indicative of the determinant groups of amino acids was not restricted to the surface, but penetration occurred during exposure. Moreover, those areas which reacted most strongly were also those most likely to become carious in the future. It was shown that under the conditions of these experiments, proteins reacted only weakly with ninhydrin, and the effects would appear to be due to the presence of amino acids and peptides.

There were thus some grounds for believing that although the major protein of enamel is an insoluble keratin, there might also be soluble protein and peptide components. Experimental evidence for the existence of these will be presented in the course of the following account of a biochemical study of the organic constituents of enamel.

MATERIALS AND METHODS

Attention was first centered on the preparation of large pooled samples of representative enamel and the purification of these samples to a high degree. Repetition of the centrifugation-flotation process[15] has been shown to yield enamel samples containing only 0.1 per cent dentin. The results of wet-combustion analyses of enamel from deciduous[16] and permanent[20] teeth showed that the organic content of enamel does not appear to depend on the age or sex of the patient nor on the type of tooth.

The second objective was a summation of the results of the wet-combustion analyses of each recognizable constituent of enamel with the expectation that this should give the value determined by direct analysis of total enamel. Thirdly, arising out of the latter problem, it was necessary to relate the yield of each constituent to the amount of reagent used in oxidizing it by the wet-combustion procedure. Otherwise the organic content would need to be expressed in terms of chemical equivalents of reagent and not on an absolute weight basis.

Table 1 • Percentage data on pooled samples of enamel from sound and carious teeth

Enamel from sound teeth			Enamel from carious teeth	
Organic* content	Dentin content	Nitrogen* content	Organic* content	Dentin content
0.56	0.10	0.057	0.52	0.08
0.61	0.16	0.063	0.66	0.14
0.62	0.10	0.063	0.56	0.08
0.60	0.14	0.061	0.68	0.04
0.59	0.20	0.059	0.62	0.05
0.59	0.12	0.061	0.52	0.03
0.56	0.25	0.058	0.68	0.10
0.60	0.19	0.062	0.66	0.06
0.65	0.16	0.067	0.58	0.08
0.63	0.08	0.064	0.55	0.16
Means 0.60	0.15	0.062	0.60	0.08

*Corrected for dentin content; 0.2 per cent dentin corresponds to 0.06 per cent organic content.

Preparation • Enamel, as it has been understood for the present purposes, is taken to be that fraction of the pulverized cleaned crown remaining immersed after repeated treatment with a bromoform mixture of density 2.75. Sound teeth were available in sufficient numbers to provide one third of all the enamel prepared, and this material was used in establishing the normal limits of variation among batches. Table 1 indicates that the use of sound enamel from carious teeth (principally molars) appears justified; stained, worn, or badly carious teeth were rejected. Other procedures, such as exposure to acetone, bromoform and heat, were examined in a series of control experiments in order to be certain

14. Hutton, W. E., and Nuckolls, J. Frequency of ninhydrin staining in the enamel surfaces of completely unerupted undecalcified human third molars in relation to the problem of caries susceptibility. Oral Surg., Oral Med. & Oral Path. 4:1451 Nov. 1951.

15. Manly, R. S., and Hodge, H. C. Density and refractive index studies of dental hard tissues. I. Methods for separation and determination of purity. J. D. Res. 18:133 April 1939.

16. Stack, M. V. Variation in the organic content of deciduous enamel and dentin. Biochem. J. 54:XV May 1953.

that there were no detectable quantitative changes.

Pulverization • Extracted teeth were stored in acetone and later dried at 100°C. for six hours so that nonocclusal enamel could be stripped off readily in large pieces. The organic content of total enamel samples did not differ from that of selected fragments, accounting for about three-quarters of the total. Exterior surfaces were lightly ground with a diamond disk until a homogeneous mat surface was exposed. Microscopically visible pit and fissure material was ground out with diamond tools. The cleaned fragments, with some adherent dentin, were pulverized in a steel mortar after which metal particles were removed magnetically. Under the conditions of operation, half the resultant powder passed a fine sieve (200-mesh per inch) and three-quarters passed a medium sieve (100-mesh).

Purification • When the flotation-centrifugation technic[15] was applied several times, using 3 parts of bromoform (density adjusted to 2.75 with acetone) to 1 part of enamel powder, the dentin impurity was reduced to a point when 10 to 20 "junction particles" were observed in a count of 1,000. With practice, it was possible to score microscopically not only particles in which the junction plane followed the optical axis, but also those in which the dentin and enamel overlapped; such particles usually comprised 1 part of dentin to 5 to 15 parts of enamel. There was a good correlation between these particle counts and the organic contents of the samples, as shown by checking during and after purification at which time allowance was made for the fact that dentin contained 40 times as much organic matter as enamel. About 3 per cent of an enamel sample was lost during purification.

Determination • Organic content was determined by oxidative wet-combustion.[16] In this, enamel samples (20 to 30 mg.) were weighed to 0.1 mg. and digested with a sulfuric acid solution of sodium dichromate at 90°C. for 15 minutes. Reagent not expended in oxidizing the organic constituents of enamel was measured by adding iodide and titrating liberated iodine with sodium thiosulfate; the coefficient of variation was 3 per cent for duplicated analyses.

Demineralization • Phosphoric acid was the only suitable solvent for calcium phosphate since it allowed direct estimations of organic content by the method described. For rapid demineralization 25 per cent acid was effective, but slightly better yields were obtained when 0.5 per cent acid was used. Ethylenediamine tetracetate solutions, adjusted to pH 7.5, removed calcium phosphate more gradually and appeared to improve the yield of insoluble protein very slightly. This was normally recovered immediately by centrifugation, but dialysis was necessary in order to recover soluble protein which was obtained in solid form by dehydration, freeze-drying, or alcohol precipitation. When weak acid was used, the 10 Gm. batches of enamel were packed in cellophane bags which were sealed with rubber bands and rocked in a large volume of fluid for two days before the acid was changed.

Extraction • When enamel was dissolved in 25 per cent phosphoric acid (8 ml. per gram), peptide material could be extracted with butanol from the acid suspension of the insoluble protein. Much smaller yields were also obtained by percolating buffer solutions through columns of powdered enamel. The peptide content of fractions was determined semiquantitatively by the use of a ninhydrin reagent[17] which provides a sensitive

17. Moore, S., and Stein, W. H. Photometric ninhydrin method for use in the chromatography of amino acids. J. Biol. Chem. 176:367 Oct. 1948.

colorimetric test for the determinant groups of amino acids. Such samples were analyzed before and after hydrolysis and the probable order of complexity of the peptides deduced from the values obtained.

Digestion • Treatments of the insoluble protein fraction with boiling water or with enzymes were favored as means of purification, but considerable loss of material occurred. It was considered, at first, that success in removing the expected collagenous impurity could be judged by following a reduction in the proportion of hydroxyproline, an amino acid typical of collagen but rarely encountered in other proteins. Later work suggested that there was a significant quantity of this amino acid in the purified insoluble protein fraction.

Separation • Purification of the soluble protein fraction was accomplished by microelectrophoresis (30 ml. from 10 Gm. of enamel). The dialyzed sample was "pervaporated" by suspending the dialyzing sac near an office fan until the volume was reduced to about 1 ml. The entire fraction was then delivered onto a small area at the center of a 20 cm. strip of thick filter paper. This was achieved by expelling the concentrated sample from a hypodermic syringe fitted with a micrometer head which was turned by a slow-speed motor; the spot area was also controlled by a stream of warm air. After electrophoresis in acetate buffer, the noncollagenous component had moved further along the strip than the impurity and could be eluted in a purified state.

Composition • The amino acid composition of the purified soluble and insoluble protein fractions was studied qualitatively by chromatography of their hydrolyzates on filter paper, using a mixture of butanol, water, and acetic acid as the mobile phase. Quantitative analysis was possible at a later stage by fractional elution of the individual amino acids from hydrolyzates applied above columns containing a sulfonated polystyrene resin.[18]

Table 2 • Percentage data on 10 Gm. batches of enamel demineralized with 0.5 per cent phosphoric acid

Batch number	Insoluble protein		Soluble protein
	Yield	Nitrogen	Yield
1	0.20	13.3	0.17
2	0.16	13.5	0.19
3	0.17	13.2	0.18
4	0.16	13.2	0.17
5	0.22	13.4	0.18

EXPERIMENTAL RESULTS

Demineralization • Yields of protein fractions as isolated were determined by weighing the dehydrated specimens prepared as described earlier; nitrogen contents of the insoluble protein were measured by weighing 0.5 mg. samples to the nearest 0.05 mg. on a glass fiber cantilever balance, digesting with sulfuric acid under oxidizing conditions and colorimetrically estimating ammonia formed. Table 2 shows the results of experiments with 10 Gm. batches of enamel demineralized with 0.5 per cent and the nitrogen values being corrected for moisture and ash (assumed equivalent to phosphate content).

When enamel was demineralized with 25 per cent phosphoric acid, it became possible, for the first time, to demonstrate that the sum of the organic contents of the soluble and insoluble fractions, before dialysis, was equal to that found for the enamel before demineralization (Table 3). Furthermore, a modification of the wet-combustion technic permitted a demonstration of the organic content of the diffusible material. It was found that when 8 ml. of the acid suspension

18. Moore, S., and Stein, W. H. Chromatography of amino acids on a sulfonated polystyrene resin. J. Biol. Chem. 192:663 Oct. 1951.

Table 3 • Percentage organic matter in 100 mg. portions of enamel as determined before and after demineralization with 25 per cent phosphoric acid

Initial	Final		Insoluble
	Insoluble	Soluble	Per cent of total
0.68	0.18	0.52	26
0.52	0.13	0.35	27
0.52	0.14	0.36	28
0.68	0.16	0.47	25
0.52	0.14	0.38	27

(containing 1 Gm. of enamel) was dialyzed against 30 ml. of water, the equilibrium volumes both became 19 ml. This process was termed "restricted dialysis," expressing a situation in which all the protein material, but half the nonprotein remained within the dialyzing membrane. Continuation of the dialysis with unlimited access to water resulted in the soluble and insoluble protein fractions being prepared free from peptide.

Comparison between Tables 2 and 3 shows that the yield of insoluble protein was decreased by one tenth when the higher acid concentration was used. When the experiment of Table 2 was repeated, it was found that the insoluble protein accounted for 40 to 42 per cent of the total nitrogen. The presence of citric acid, which is oxidized by the dichromate reagent, accounts for this difference in proportion according to the two types of analysis. Previous values[19] for the citric acid content of enamel (0.10 per cent) were confirmed by a similar method.[20]

Because it was possible to isolate and purify the soluble and insoluble proteins in these experiments, the amounts of dichromate reagent required to oxidize each could be determined. It was fortuitous that for neither protein was a numerical factor required to relate chemical equivalents, as indicated by titrations, to the weights analyzed. Since the peptide fraction has not yet been isolated in a state suitable for weighing, the assumption has been made that the same simple relationship also holds in this case. For the 0.1 per cent citric acid and collagen contents of these enamel samples, the numerical factor was not unity, but 15 per cent less in the case of the former and 15 per cent more in the case of the latter. Because of these convenient relationships, the total organic content of enamel samples, on a percentage basis (by weight) thus appears to be numerically the same as the chemical titration equivalent found from analyses with the dichromate reagent.

Extraction • Only about one tenth of the peptide material in enamel could be eluted directly from the powdered tissue. In a typical experiment, 5 ml. of water were poured onto 10 Gm. of enamel packed in a 15 cm. tube and 2 ml. of eluate were collected in 15 fractions. The organic content and the amount of ninhydrin-positive material were determined (both in arbitrary units) in each fraction. Table 4 shows that the two analyses were correlated, but as the peptide fraction appears to account for about one quarter of the organic content of enamel, soluble protein must also have been extracted by this procedure. The amount of ninhydrin-

19. Zipkin, I., and Piez, K. A. Citric acid content of human teeth. J. D. Res. 29:498 Aug. 1950.

Table 4 • Analyses of water-soluble fractions, eluted from a column of enamel (10 Gm.), by dichromate and ninhydrin reagents

Fraction number	Organic units*	Peptide units†
1-2	14	12
3	6	5
4	4	3
5	3	3
6	3	3
7	3	2
8-15	11	9
Total	44	37

*Summation equivalent to one fifteenth of total organic content.

†Summation equivalent to one tenth of total peptide content.

positive material was raised to a value five times greater after hydrolysis, and this was taken to mean that lower peptides probably were present. From these values, the probable peptide content of enamel was thought to be 0.15 per cent.

The proportion of ninhydrin-positive material which could be extracted by butanol from 12.5 per cent "solutions" of enamel in 25 per cent phosphoric acid was nearly five times greater than that which could be extracted directly from enamel; this proportion rose slowly on long standing. Direct reaction of enamel (or boiling aqueous extracts thereof) with buffered ninhydrin,[17] however, indicated ten times as much of this fraction as could be eluted from columns of enamel. Table 5 shows that the peptide levels, in arbitrary units, were correlated with the total organic contents of the samples of purified enamel heated directly with the reagent.

Digestion • Freshly isolated insoluble enamel protein was treated overnight at suitable pH levels with crystalline enzymes and with a collagenase preparation. The intention was to remove the collagenous impurity, but the greater part of the sample also dissolved in each instance, as shown in Table 5. The extent of purification was judged by determining the ratio of nitrogen to hydroxyproline. This amino acid was estimated by oxidation and coupling with a substituted aldehyde;[21] a significant quantity was found to be present in the protein even after purification. Table 6 shows that the ratio for enamel protein was raised from the normal level to five times that found for collagen (1.2) by extraction with boiling water for several hours.

Table 5 • Peptide and organic contents of individual enamel samples

Organic content (per cent)	Peptide (arbitrary units)
0.54	24
0.55	26
0.57	26
0.65	31
0.60	33
0.66	38
0.69	38
0.70	38

Some of these results were checked with enamel, prepared without exposure to bromoform or heat, from unerupted third molars which were removed from patients a few hours before the final analyses.

Table 6 • Attempted purification of the insoluble enamel protein

Treatment of protein	Percentage* dissolved	Nitrogen†
		Hydroxyproline
None	—	2.2
Collagenase	81	2.7
Chymotrypsin	70	2.3
Pepsin	77	3.2
Trypsin	82	3.8
Water at 100°	20	6.4

*Determined as nitrogen.
†Determined on residue.

When nail and hair keratins were hydrolyzed for these comparative analyses in the same way, the ratios of nitrogen to hydroxyproline were nearly 70 and 90 respectively. Collagen samples treated with the crystalline enzymes and with collagenase were dissolved almost completely under the conditions chosen. For quantitative chromatography, samples of the insoluble protein were therefore treated with boiling water and the ratio of nitrogen to hydroxyproline in the residue was checked before use.

Protein prepared from the outer half of the enamel contained a very similar proportion of hydroxyproline to that present in purified protein from total enamel, although in the former instance contamination by dentin or enamel spindles was unlikely.

Separation • A similar comparative analytical technic was effective when following the progress of electrophoresis during purification of the soluble protein fraction. In a typical experiment where migration was induced (pH 6.6, 6 hours,

Table 7 • Nitrogen and hydroxyproline in segments of filter paper on which soluble enamel proteins were separated electrophoretically

Segment number	Nitrogen (micrograms)	Hydroxyproline (micrograms)	Nitrogen / Hydroxyproline
1	17	5	3.4
2	28	4	7.0
3	36	5	7.2
5	14	8	1.7
6	19	14	1.4
7	23	18	1.3
8	6	4	1.5

The missing fraction probably represents the boundary between the collagenous component (ratio expected to be 1.2) and the component believed to be the actual soluble protein of enamel. This material contained 10 per cent nitrogen, and has been analyzed for hexose and hexosamine content.

120 volts), the values recorded in Table 7 were obtained for successive 10 mm. segments which were cut from the operative portions of the strip and analyzed for nitrogen and hydroxyproline.

Composition • An orcinol-sulfuric acid reagent[20] was convenient for the determination of the hexose components of the enamel proteins. Ratios of colorimetric readings with "blue" and "blue-green" filters were plotted continuously while heating samples with the reagent. From the resultant curves relating time to optical density ratios, it was concluded that the hexose was probably glucose in both cases, and that the soluble and insoluble proteins were associated with 0.019 and 0.006 per cent glucose respectively.

These fractions also contained 0.004 and 0.001 per cent hexosamine; this was determined by acetylation and coupling with the same substituted aldehyde as for hydroxyproline analysis.[20] Numerous control experiments were designed to include chondroitin sulfate, assumed provisionally to be the source of the hexosamine determined. When this mucopolysaccharide was added to enamel (80 micrograms to 2 Gm.) and the mixture hydrolyzed, 85 to 105 per cent of the expected hexosamine was recovered. The total mucopolysaccharide content of enamel was thus calculated to be 0.015 per cent.

Preliminary study of the soluble and insoluble proteins involved semiquantitative paper chromatography by means of which these proteins were compared with similar hydrolyzates of skin, nail and hair keratins. The main study of the composition of the insoluble protein of enamel has been directed toward determining the amino acids by quantitative chromatography, with special reference to the basic amino acids. Samples (about 2 mg.) of the purified protein, hydrolyzed overnight with 10-normal hydrochloric acid at 120° C., were evaporated several times at reduced pressure and loaded above vertical columns of sulfonated polystyrene resin; a different hydrolyzate was used for each experiment. One of these columns (100 cm. long) permitted a complete fractionation. It is usual, however, to cease operating this before the elution of the basic amino acids which are only eluted quantitatively under conditions suitable for the operation of the shorter (20 cm.) column.

During three experiments with the shorter column, 67, 66 and 70 per cent of the loading was eluted in the first 20 fractions, and the runs were completed shortly after the two-hundredth fraction. During an experiment with the longer column, 700 to 800 fractions were collected in the course of about ten days.

The columns were operated simultaneously, so that about 100 fractions were collected each day in the two volumetric fractionators. These were analyzed by the buffered ninhydrin reagent[17] in terms of leucine standards, using a color correction factor. Table 8 shows the values obtained with an insoluble protein prep-

20. Stack, M. V., and Williams, G. Quantitative variation in the total organic matter of enamel. Brit. D. J. 92:261 May 20, 1952.

aration which had been purified by extraction with boiling water before hydrolysis. This was the only experiment run to full length on the longer column, but all the technics involved had been checked thoroughly with hide collagen as the known protein. Colorimetric analysis of the initial hydrolyzate showed that the loading was equivalent to 20 micromoles of leucine, 97 per cent of this being collected in the course of the experiment. The molecular ratios of histidine, lysine, and arginine were determined on the shorter columns to be 1:3.0:12.2 and 1:3.9:11.8 in two experiments. Ratios for a eukeratin are 1:4:12 according to definition.[10] Cystine, which is easily oxidized, was not recovered in these experiments. Hydroxyproline was determined more accurately by the previous method[21] since the color equivalent is only 5 per cent of that given by leucine.[18]

Table 8 • Quantitative chromatographic analysis of purified enamel keratin hydrolyzate* on sulfonated polystyrene resin

Amino acid recovered	Fraction numbers	Per cent by weight
Hydroxyproline	80-90	4.1
Aspartic acid	93-102	3.1
Threonine	110-122	9.1
Serine	121-131	8.2
Glutamic acid	132-192†	(3.6)
Proline	132-192†	(8.3)
Glycine	217-228	5.2
Alanine	232-244	6.9
Valine	282-302	4.0
Methionine	334-344	1.5
iso-Leucine	350-358	2.6
Leucine	360-372	7.8
Glucosamine	382-387	0.5
Tyrosine	389-396	2.8
Phenylalanine	395-405	8.3
Histidine	503-509	0.9
Lysine	637-650	3.6
Arginine	704-724	12.8
Ammonia	722-760	3.7
		97.0

*Hydrolyzate—20.1 micromoles leucine. Recovery—19.5 micromoles leucine.

†Volumetric fractionator relay defective during collection of 60 fractions; values extrapolated from another experiment.

COMMENT

The initial yields of insoluble protein (mean 0.18 per cent) correspond to those previously reported[7] for "enamel proper with minimal pits and grooves" (yield 0.22 per cent) and "enamel proper with pits and grooves ground out" (yield 0.21 per cent). Mention of similar quantities of soluble protein and peptide material has not been observed in the literature. It is tempting to suppose that it is these latter fractions which play a leading part in those phases of the carious process which involve the organic constituents. The chief difficulty in the study of the insoluble protein has been the presence of an amino acid characteristic of collagen, even in purified preparations. Therefore progress in removing the collagenous impurity from the enamel protein could not be followed readily by determinations of this amino acid. Particular attention has been directed toward proving whether hydroxyproline is a true component of the insoluble protein of enamel. If the analyses can be accepted, collagen is the only protein hitherto studied which contains a higher proportion of this amino acid. The insoluble protein of enamel may be termed a "eukeratin" because of its low solubility and because of the relative proportions of histidine, lysine, and arginine (redetermined during the present study). It has, however, no great resistance to enzymes, low levels of the sulfur-containing amino acids, and a hydroxyproline content which suggests some affinity with collagen.

For the purposes of analysis, the collagenous components of the soluble and insoluble proteins have been classed as impurities, but it is apparent that some of the collagen present is contained in the enamel proper, and not merely in the enamel spindles or in the contaminat-

21. Neuman, R. E., and Logan, M. A. The determination of collagen and elastin in tissues. J. Biol. Chem. 186:549 Oct. 1950.

ing dentin. There is no certainty that the insoluble protein is not changed by the extraction procedure used to remove this collagenous material (boiling in water for several hours), but calculations from the quantitative chromatograms have shown that the purified protein has a similar composition to that of the freshly isolated protein without its associated collagen. It is also improbable that the conditions of storage, drying or demineralization contributed toward the appearance of soluble protein, since freshly prepared enamel demineralized at pH 7.5 shows substantially the same proportion of the two proteins.

SUMMARY

1. Soluble protein (0.17 per cent) and peptide constituents (0.15 per cent) of human dental enamel have been investigated, in addition to the insoluble protein (0.18 per cent) and citric acid (0.10 per cent) already determined by previous authors. The total corresponds to the total organic content of the enamel (99.9 per cent pure) as found by an independent method of estimation.

2. Collagenous material has been removed from the insoluble protein before hydrolysis and determination of the amino acid composition by quantitative chromatography on sulfonated polystyrene resin columns. The purified material still contained hydroxyproline, an amino acid characteristic of collagen and rarely encountered elsewhere.

3. Electrophoresis of the soluble protein fraction also removed collagenous material. Carbohydrate and hexosamine analyses are reported for the soluble and insoluble proteins, the former thereby being classed as a glycoprotein.

4. Peptide was extracted in small yield by aqueous extraction of enamel and in better yield by butanol extraction of "solutions" of enamel in 25 per cent phosphoric acid. The amount estimated directly in enamel was related to the organic content.

5. Sound enamel from carious teeth was used for many of the above experiments. According to measurements on pooled samples, representing at least 1,000 teeth, this material had the same organic content as enamel from sound teeth.

Harnessing Sunlight • A chemical reaction that uses light energy to convert water into an explosive mixture of gaseous hydrogen and oxygen has been discovered by Lawrence J. Heidt of the Massachusetts Institute of Technology. Heidt and his collaborators are hopeful that the reaction, so far demonstrated only in the laboratory, can be developed into a large-scale process for turning sunlight into chemical energy.

The method employs a solution of the rare-earth element cerium. Cerous ions (plus-three valence) in the solution absorb light energy, react with water, are iodized to ceric ions (plus-four valence) and release hydrogen. Ceric ions also absorb light, and in so doing are reduced to the plus-three state and release oxygen. Thus a mixture of ceric and cerous ions under the action of light will jump back and forth between the two states and go on releasing hydrogen and oxygen. *Science and the Citizen. Scientific American 188:50 March 1953.*

Comparative bactericidal effects of various temperatures of hot oils

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Much has been written on the effect of high temperatures of dry heat on bacterial spores,[1-3] and the variation in their resistance to both chemical and physical agents is recognized.

In contrast to the considerable literature on spores, relatively little has been published on comparative bactericidal effects of dry heat, at temperatures from 100° to 160°C., against partially dry nonspore-forming bacteria.

In an earlier study,[4] temperatures of white mineral oil from 121° to 125°C., 148° to 154°C. and 160°C. were compared with 100°C. water in relation to time required to kill *Staphylococcus aureus* and certain bacterial spores. Since the latter report, silicone fluid and various commercial oily preparations with a less objectionable odor than white mineral oil have been in popular use. Furthermore, several combinations of time and temperatures have been suggested for disinfecting dental instruments with hot oil. Therefore, the aims of the following experiments were to:

1. Compare the bactericidal effectiveness of different oily preparations at varying temperatures against both bacterial spores and nonspore-forming bacteria.
2. Compare the sporicidal effectiveness of various temperatures of hot oil with 100°C. water.
3. Study the possibility of using the resistance of a given suspension of bacterial spores to 100°C. water as a guide in evaluating sporicidal effectiveness of hot oil.

EXPERIMENTS

Method of Contamination • Sterile Johnson and Johnson absorbent paper points and sterile (hand) root canal reamers and files were contaminated with test organisms. The test organisms included (a) saline suspensions of bacterial spores and (b) 18 to 20 hour (Difco) brain-heart infusion broth cultures of nonspore formers.

The suspensions of spores were obtained by emulsifying 7 to 10 day old agar slant cultures in sterile 0.85 per cent sodium chloride solution. The anaerobic spore formers were grown on (Difco) blood agar base medium containing 5 per cent sheep blood and the aerobic spore formers on a similar medium minus the blood. The anaerobes were cultivated in Brewer anaerobic jars

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1. McCulloch, E. C. Disinfection and sterilization, ed. 2. Philadelphia, Lea & Febiger, 1945.
2. Williams, O. B., and others. Symposium on the biology of bacterial spores. Bact. Rev. 16:89 June 1952.
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Table 1 • Comparative effect of boiling water and different temperatures of hot oil against certain bacterial spores

Spores of	Number of minutes* required to kill spores of organisms tested						
	Hot oil (°C.)						H_2O
	180	170	160	150	140	130	100°C.
Cl. tetani	1	5	10	20	40	>60	20
Cl. septicum	1	5	10	20	40	>60	15
Cl. histolyticum		1	5	10	30	60	15
Cl. botulinum	1	5	10	30	60	>60	20
B. subtilis		1	5	15	40	>60	10
B. megaterium		1	5	15	15	40	5
B. (species?)		1	5	10	30	>60	30

*Tests run at 1, 5, 10, 15, 20, 30, 40 and 60 minute intervals.

and hydrogen was used to aid in reducing the oxidation-reduction potential.

Spore suspensions were heated at 80°C. for 10 minutes, and the number of viable spores estimated by routine agar pour-plate counts. These stock suspensions were kept at 6° to 8°C., and dilutions for contaminating instruments were made so as to contain from 5 to 10 million spores per milliliter.

The contaminated objects were placed in sterile Petri dishes and left to dry: (a) 48 hours at room temperature for spores, and (b) 6 hours at 37°C. for nonspore formers.

Results of preliminary experiments indicated a slightly higher percentage of positive cultures after exposure of spores to hot oil if paper points were used as carriers rather than metal instruments. The latter variation may have been due to the fact that bacterial spores subjected to sublethal temperatures of dry heat required from 2 to 21 days to produce visible growth in tubes of culture media; thus, the rusting of instruments during the prolonged incubation period may have exerted some bacteriostatic influence.

In contrast to the preceding observation there was a greater percentage of positive cultures in case of nonspore-formers if the metal instruments were used as carriers. The reason for this may be the more complete dehydration of bacteria on metal instruments than on absorbent paper points during the 6 hour period of drying; thus, the possibly greater amount of moisture may have accounted for the more rapid death of the vegetative cells during exposure to hot oil. The latter observations influenced the choice of paper points as carriers for spores and metal instruments for the vegetative cells throughout the experiments.

Determination of Bactericidal Action •

The contaminated objects were placed in various temperatures of hot oil or in 100°C. water and left for desired intervals of time. After the designated time of exposure each contaminated object was removed with sterile pliers and placed in a tube containing 10 ml. lots of (B.B.L.) fluid thioglycollate broth. All cultures of nonspore-formers were incubated for 7 days and those of spore formers for 28 days before recording cul-

Table 2 • Comparative effect of boiling water and different temperatures of hot oil against partially dry nonspore-forming bacteria

Species	No. strains tested	Number of min.* required to kill						
		Oil (°C.)						H_2O
		150	140	130	120	110	100	100°C
S. aureus	6	1	5	10	20	30	>30	1
S. aureus	2		1	5	15	30	30	1
S. albus	1		1	5	15	30	30	1
S. albus	1		1	5	5	15	30	1
Str. viridans	1		1	5	10	20	30	1
E. coli	1			1	5	5	10	1
A. aerogenes	1		1	5	10	20	30	1

*Tests run at 1, 5, 10, 15, 20 and 30 minute intervals.

Table 3 • Comparative effect of different oils against *Clostridium septicum* spores

Oil	Number of minutes* required to kill spores of *Cl. septicum*	
	160°C.	150°C.
Silicone	10	20
Castle ("No Odor")	10	20
Whip Mix No. 20	10	20
Whip Mix (Mineral Oil)	10	20

*Tests run at 5, 10, 15, 20 and 30 minute intervals.

tures as negative. Positive cultures were studied both microscopically and culturally to rule out contaminants.

At least ten contaminated objects were tested for each time and temperature combination for each organism listed in Tables 1-4. The results are recorded in Tables 1-4.

Discussion of Results • Several points of interest are suggested by the results shown in Table 1.

1. There was an approximate two to threefold decrease in time required to kill spores with each 10°C. increase from 130°C. to 160°C. of hot oil.

2. The time necessary to kill spores in 100°C. water could not be correlated with any given temperature of hot oil. For example, 100°C. water was more rapid in effect against spores of *Clostridium septicum, Clostridium botulinum, Bacillus subtilis,* and *Bacillus megaterium* than was 150°C. oil; but the reverse was true against *Clostridium histolyticum* and the unidentified aerobic species. Oil at 160°C. was more rapid in effect than 100°C. water against all species tested. However, 140°C. oil was markedly less rapid in apparent sporicidal effect against all except the unidentified bacillus.

Thus, 100°C. water does not seem to be a suitable standard for an exact evaluation of sporicidal effects of hot oil. On the other hand, data on resistance of spores to 100°C. water would seem to be of value in controlling exaggerated claims based on use of suspensions of sporulating bacteria chosen at random. It should be remembered that results of sporicidal effects based on use of stock cultures are not definite proof that all spores of similar species are killed under similar conditions.

The nonspore-forming bacteria listed in Table 2 included two stock strains of *Staphylococcus aureus* and six other strains recently isolated from staphylococcal lesions in humans. The two relatively less resistant strains were from the recently isolated group. The more resistant strain of *Staphylococcus albus* and the *Streptococcus viridans* strain were recently isolated from the oral cavity and all other strains were stock cultures.

Results noted in Table 2 indicate the significantly greater resistance of certain relatively dry nonspore-forming bacteria to hot oil at temperatures of 130°C. and lower, as compared with water at 100°C. A study of data on hot oil listed in Table 2 suggests:

1. A temperature of 150°C. is necessary for the destruction within one minute of all vegetative cells tested.

2. A temperature higher than 120°C. is necessary if all vegetative cells are to be killed within 10 to 15 minutes.

Table 4 • Comparative effect of different oils against *Staphylococcus aureus*

Oil	Number of minutes* required to kill					
	150°C.	140°C.	130°C.	120°C.	110°C.	100°C.
Silicone	1	5	10	20	30	>30
Whip Mix No. 20	1	5	10	20	>30	>30
Castle ("No Odor")	1	5	10	20	>30	>30
Kodex	1	5	10	20	>30	>30
Whip Mix (Mineral oil)		1	5	10	15	>30

*Tests run at 1, 5, 10, 15, 20 and 30 minute intervals.

Table 5 • Temperature changes following placing of instruments in hot oil

Ml. of oil	Gm. weight of instruments	Starting temperature °C.	Temperature after 1 min. °C.	Minutes required to reach starting temperature
400	400	160	142	8 to 10
400	300	160	146	8 to 10
400	200	160	155	6 to 8
400	100	160	157	3 to 4
400	400	150	137	10 to 12
400	300	150	138	10 to 12
400	200	150	144	8 to 10
400	100	150	147	4 to 5
400	400	121	109	10 to 12
400	300	121	112	8 to 10
400	200	121	115	6 to 10
400	100	121	118	3 to 4

3. Results with the more resistant *Staphylococcus aureus* strains indicate that with hot oil, the time required to kill decreased approximately two-fold with each 10°C. rise in temperature in the range 120° to 140°C.

Results recorded in Table 3 indicate that under the conditions of this experiment the various oils tested did not differ in sporicidal efficiency at temperatures between 150°C. and 160°C.

Table 4 offers a comparison of the effectiveness of several commercial oil preparations against *Staphylococcus aureus*. It will be noted that results were similar for all except the "Whip Mix" mineral oil. This particular mineral oil reduced the time necessary for bactericidal action approximately twofold as compared with the other preparations at 110° to 140°C. The latter results may be due to residual chemicals; but whatever the reason, the use of this oil would be impractical for instrument disinfection because of the odor produced and its relatively low flash point.

It should be remembered that the data recorded for hot oil in Tables 2 and 4 were based on tests against relatively dry vegetative cells. Similar tests were also made by placing the instruments in the hot oil immediately after contaminating them with broth cultures of *Staphylococcus aureus*. In the latter experiment, no growth was obtained from any of 20 contaminated instruments after a five minute exposure to 120°C. oil. The results with wet instruments are more in agreement with similar experiments by Parke.[5]

In spite of the latter observations, there appear to be at least two major disadvantages to routine use of oil at temperatures of 120°C. and lower for disinfection of dental instruments. First, one cannot always be sure of the amount of moisture in or around contaminating bacteria. Second, there may be a significant drop in the temperature of the oil after placing the instruments in the sterilizer. To illustrate the latter point, 400 ml. of oil was placed in an oil sterilizer approximately 11 by 21 by 7 cm. in size. The oil was heated to a desired temperature and numbers of different metal dental instruments were placed in the oil. The temperatures were recorded before

5. Parke, G. L. Sterilization effectiveness of a hot oil bath. J. D. Res. 25:89 April 1946.

placing the instruments in the oil and at one minute intervals afterwards. The results recorded in Table 5 are based on an average of four tests for each time and temperature combination. These particular results offer the following possibilities if the gram weight of instruments equals 50 per cent to 100 per cent of the milliliter volume of oil.

1. The temperature of the oil may drop from 6° to 18°C. within one minute.
2. Six to 12 minutes may be required to regain the starting temperature.

Thus, if relatively short periods of 10 to 15 minutes are used for disinfecting dental instruments, a temperature of 150°C. offers a far greater margin of safety than do temperatures of 140°C. or less. By the same line of reasoning, if it is practical to use oil at 160°C., an even wider margin of safety is assured.

SUMMARY

The bactericidal effects of various temperatures of hot oils were studied.

The time required to kill spores of stock cultures decreased from two to threefold for each 10°C. rise in temperature between 130° to 160°C.

The time required for a bactericidal effect on partially dry nonspore-forming bacteria decreased approximately twofold for each 10°C. rise from 120° to 140°C.

It required 160°C. hot oil to surpass 100°C. water in rapidity of sporicidal effectiveness.

It was necessary to heat oil at 150°C. to kill certain relatively dry nonspore-forming bacteria within one mintue.

There was little or no difference in the bactericidal effectiveness of the relatively nonodorous oils tested.

Good Will • If it were given me to look into the depths of a man's heart, and I did not find good will at the bottom, I should say without any hesitation, you are not an American. But as the American is an individualist his good will is not officious. His instinct is to think well of everybody, and to wish everybody well, but in a spirit of rough comradeship, expecting every man to stand on his own legs and to be helpful in his turn. When he has given his neighbor a chance he thinks he has done enough for him; but he feels it is an absolute duty to do that. It will take some hammering to drive a coddling socialism into America. *George Santayana, "Character and Opinion in the United States," 1920.*

Cases and Comments

FOREIGN BODY IN THE NECK

By I. Bernstein, Captain, USAF (DC), and M. Small, Captain, USAF (MC).

A 45 year old man, otherwise in good health, came to the dental clinic one day complaining of pain and swelling in the left upper throat and submaxillary region. Clinical and routine roentgenographic examinations of the teeth were negative. There were moderate swelling and tenderness over the entire left mandibular and inframandibular regions extending into the neck.

An anteroposterior roentgenogram of the face and neck (illustration, above) disclosed an irregular 4 mm. metallic foreign body in the soft tissues 1.0 cm. from the outer margin of the angle of the left side of the mandible. Subsequent lateral and oblique views, however, proved that the foreign body was not in the region of the submaxillary gland but was, rather, in the soft tissues of the throat at the level of the fourth cervical vertebra (illustration, below). Careful questioning revealed that the patient had suffered a gunshot wound ten years earlier.

This illustrates the importance in such cases of making a complete roentgenographic examination in addition to the routine periapical examination. It shows that the anteroposterior view alone is not sufficient to localize disease in this region, for the overlapping of the soft tissues of the inframandibular areas and the neck can occur as low as the lower cervical spine, depending on the position of the patient's head while the films are being taken. What may appear to be in the submaxillary region in the anteroposterior view may be, as in this case, low in the neck, as was demonstrated by the lateral projections.

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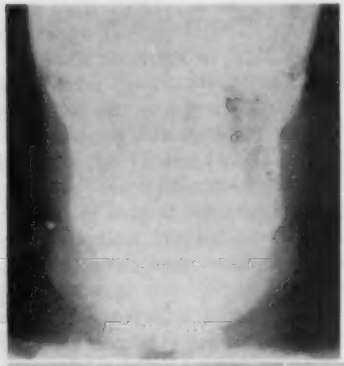

Left: Anteroposterior view of face and neck. Below: Lateral and oblique views

FRACTURED CENTRAL INCISOR

By Albert L. Gallatin, D.D.S., Forest Hills, N. Y.

A woman, aged 65, had fallen and loosened her front teeth. Roentgenographic examination indicated good bone structure throughout the mouth, but the right central maxillary incisor was fractured at the apical fourth of the root and extruded. All the maxillary incisors were loose, but the right central incisor was exceptionally mobile and painful on percussion. The Burton electrical pulp tester registered 10 for the incisor and the control tooth registered 4. The right central incisor was pushed back into position and the anterior teeth were ligated with wire.

Two weeks later, the anterior teeth had tightened with the exception of the right central incisor which remained loose and extremely painful.

Treatment • Lidocaine was used locally but it was impossible to apply the rubber dam to the loose tooth. Absorbent paper was used to cover the tongue. When the pulp chamber was opened it was found that the pulp was entirely necrotic. Reamers and files, no. 1 to 5, were used in that order and the entire root canal was cleaned and irrigated with chlorinated soda and peroxide, after which a polyantibiotic mixture, penicillin, bacitracin, streptomycin and caprylate sodium, was sealed in. A negative culture was secured after four treatments but the tooth was still loose. The largest possible silver wire was fitted and cemented into the canal. One week later the tooth had tightened and up to the present time there has been no color change.

Summary • An extremely nervous woman, 65 years old, was saved the emotional stress of losing a perfectly formed anterior tooth. The bacteria present in the main canal and fractured root were destroyed after several treatments with a polyantibiotic mixture. If a granuloma should form around the root, the chances are it will be sterile and be resolved by the repair process of the body.

A periodic roentgenographic examination will be made to check on the bone structure.

6704—110 Street

The Mature Individual • Fortunate is the individual who can so govern the expression of his instinctive drives as to experience the least conflict in adaptation. Attainment of such adequate self-direction leads to the inner security, the preservation of mental health, and the integrity of personality necessary for wise decisions and ethical conduct. Honesty, courage, facing reality, getting along with others, and doing his job well are indications that a person thinks and acts as a responsible member of society. Moreover, in acquiring these desirable qualities of personality, he has developed the major distinction that marks him as a mature adult; he has progressed from egocentricity to social consciousness—self is subordinated in service to others. The immature individual's attitude toward society is indicated by his goal, as expressed in terms of "What can I get out of it?" The mature individual thinks and acts in terms of "What can I give? What opportunity for service is available?" Habits of thoughtfulness, consideration, kindness, and tolerance have crystallized in the personality and have made self-evident the fact that usefulness brings the greatest satisfaction in life; that happiness is based not upon material things alone, but upon the security of a self-disciplined life motivated by interest in the welfare of one's fellow man. *F. S. DuBois, M.D., "The Security of Discipline." Mental Hygiene, July 1952.*

COUNCIL ON HOSPITAL DENTAL SERVICE

Report on conference between American Dental Association and the Joint Commission on Accreditation of Hospitals

The position of the dentist on the hospital staff and the position of the dental service in the administrative and professional organization of the hospital became focal points of attention during 1953 for both the chief of the dental service and the hospital administrator. Variations in standards of approval and accreditation revealed the need for a common base line of interpretation for the *Basic Standards of Hospital Dental Service,* established by the Council on Hospital Dental Service, and the *Standards for Hospital Accreditation,* established by the Joint Commission on Accreditation of Hospitals.

On November 3, 1953, representatives of the Special Committee on Problems in the Field of Oral Surgery and the Council on Hospital Dental Service, representing the American Dental Association, met with representatives of the Joint Commission. The dental representatives were: Leslie M. FitzGerald, president, American Dental Association; Daniel F. Lynch, president-elect, American Dental Association; James R. Cameron, American Board of Oral Surgery; Otto W. Brandhorst, past-president, American Dental Association, and Frank B. Hower, chairman, Council on Hospital Dental Service. Staff members present were: Gerard J. Casey, secretary, Council on Hospital Dental Service; Shailer Peterson, secretary, Council on Dental Education, and Mr. Reginald Sullens, assistant secretary, Council on Dental Education. The representatives of the Joint Commission were: Gunnar Gundersen, M.D., chairman, Joint Commission; William S. Middleton, M.D., member of the Board of Commissioners of the Joint Commission, and Edwin L. Crosby, M.D., director, Joint Commission. Advisory to the Commission representatives was Charles U. Letourneau, M.D.. secretary, Council on Professional Practices in Hospitals, American Hospital Association.

The conference concerned itself with the discussion of the *Basic Standards of Hospital Dental Service* as they related to (1) the admission and discharge of hospital dental patients, (2) the dentist

on the medical staff and (3) the problems of oral surgery in a hospital program. Complete agreement was reached by the conferees on interpretation of both the *Basic Standards of Hospital Dental Service* and the *Standards for Hospital Accreditation.*

The following is a statement issued by the Joint Commission on Accreditation of Hospitals in its bulletin of December 1953:

INTERPRETATION OF DENTAL STAFF STANDARD

The Board reviewed the recommendations of a liaison committee between representatives of the Joint Commission and the American Dental Association headed by Doctor Leslie M. FitzGerald, President. The Committee considered Standard CONTINGENT II D. "Dental Staff."

> "The dental staff shall conform in general to standards established for the medical staff (see REQUIRED II). In addition:
>
> 1. Members of the dental staff shall be graduates of approved schools of dentistry.
> 2. Patients admitted for dental services shall be admitted on a surgical service and shall be the responsibility of the chief of that service.
> 3. Adequate medical survey, by a member of the service to which admitted, shall be done on each patient before dental surgery. Indicated consultations shall be held in complicated cases."

The Board approved the following interpretation of this Standard with regard to the dental staffs in well departmentalized hospitals:

> "Depending upon the local situation and the qualifications of the individuals involved, CONTINGENT II D, Section 2, might be interpreted to mean that 'a surgical service' may be the oral surgical service to which the members of the dental staff admit and discharge dental patients, provided that this service is the responsibility of the Chief of the Department of Surgery and that Section 3 of the Standard is complied with actively.
>
> "In these instances, the bylaws of the staff would indicate that the staff of the hospital would be a 'medical and dental staff' and that within the framework of the hospital's staff bylaws, dentists would be appointed to and hold appointments in the division of oral surgery just as physicians and surgeons are appointed to other services of the hospital."

The Board emphasized that "the medical survey" referred to in CONTINGENT II D 3 must be done by a Doctor of Medicine on the medical staff of the hospital.

The interpretation was accepted and approved by the full Board of Commissioners of the Joint Commission on Accreditation of Hospitals at its annual meeting on December 5, 1953.

The Council on Hospital Dental Service in its relationships with hospitals will give continuing attention to the position of the dentist on the hospital staff and to the position of the dental service in the administrative and professional organization of the hospital.

COUNCIL ON FEDERAL DENTAL SERVICES

Current view of the military liability of dentists

The period of time during which any group of dental special registrants will be required to enter active military service cannot be predicted exactly. The determining factors such as (1) the personnel strength of the Armed Forces, (2) the number of dental officers who extend their periods of active service, and (3) the number of high priority special registrants reclassified from a deferred to the vulnerable I-A classification, are not susceptible to exact prediction. The Council's projections in this report are based on the estimated future need for dental officers and an appraisal of the sources available to satisfy that need.

ENACTMENT OF P. L. 84

The outstanding weaknesses and inequities of P. L. 779 apparently have been adequately corrected by the amendments enacted in June 1953. Where the provisions of the new law were not self-operating, adequate executive orders have been issued. In other words, both the Department of Defense and Selective Service have issued directives or instructions necessary to accomplish the required objectives of the new legislation.

DEPARTMENT OF DEFENSE DIRECTIVE

The directive that was originally issued in October 1953 was satisfactory in all major respects except one. It failed to provide for the adjustment of the grades of reserve dental and medical officers as required by the new law. The law directs, in effect, that all professional experience prior to entrance upon active duty must be counted to determine the rank in which a reserve dental or medical officer will serve. The directive, however, required the services to count only the professional experience prior to appointment to commission. Under the directive, as originally presented, then, a reserve dental officer who received his commission six or seven years ago might not be credited with the years of professional experience between that date and the date of recall to active duty. The Association immediately pointed out that defect in the directive and an appropriate change was made. Under the modified directive any dentist ordered into military service is assured that all his professional experience up to the date he reports for active duty will be counted in determining his grade and pay.

RENEWAL OF SELECTIVE SERVICE CALLS

The Navy has notified the Department of Defense that it will be unable to find replacements for about 190 dental officers scheduled for discharge during the early part of 1954. Unless the Department of Defense is able to furnish the necessary replacements from Army and Air Force reservists not yet activated, it can be expected that a call will be placed upon Selective Service to furnish the replacements. The Association has been assured by the National Advisory Committee to Selective Service that the call when and if issued will be limited to available and acceptable dentists remaining in Priorities I and II and to dentists under the age of 30 years within Priority III. Should a call be made for dentists by Selective

Service in February or March (a reasonable expectation), it will be the first such call since June 1953.

FUTURE MILITARY REQUIREMENTS

Regardless of whether Selective Service calls will be used or volunteers will come forth to satisfy the military's dental officer needs for the remainder of fiscal year 1954 (up to July 1, 1954), the pool of available Priority I and II dentists and those Priority III dentists available from the graduating class of 1953 probably will have been exhausted by that date.

For fiscal year 1955—that is, between July 1, 1954 and June 30, 1955—the military will need approximately 2,700 dentists to replace those scheduled for discharge during that period. Two categories of dental special registrants will be vulnerable to Selective Service calls to fill that requirement. In the highest priority will be the 1954 dental graduates who have had no previous active military service. Approximately 1,700 1954 graduates of the dental schools will be in that category. They will be added to the group having what is commonly known as dual liability. They are liable basically as regular registrants, and upon graduation in June 1954 they will become additionally liable as special registrants. The second vulnerable category of dentists is composed of those special registrants within Priority III who are not dually liable but who are 45 years of age or younger. Some 1,400 of the 1,700 1954 dental graduates liable for military service should become available and acceptable for service. The remainder will be deferred for some cause; a loss of 20 per cent through deferments can be expected. Fourteen hundred of the 2,700 dental officer replacements for fiscal year 1955, therefore, should come from the 1954 dental graduates. That means, of course, that 1,300 replacements or thereabouts might have to be furnished from those in Priority III who are not dually liable.

There has been no Selective Service call for dental special registrants since June 1953. In that month Selective Service issued orders to dentists from Priority III, some of whom were 42 years of age. (Priority III dentists must be called according to age, the youngest groups first.) Although there are, perhaps, some Priority III dentists below the age of 42 who have, since June 1953, been classified or reclassified as available and acceptable, they will, apparently, be insufficient in number to meet the need. There is little doubt, therefore, that Priority III dentists 42 through 45 years of age will be vulnerable for active military service, unless there is a reduction in the ratio of dental officers to military personnel.

"NEW LOOK" SHOULD BEGIN NOW

The military at present conducts its dental program with an average dental officer strength in the ratio of 1.9 dentists per 1,000 of military personnel. It should be evident to the military that sound planning for the immediate future will require that the ratio be revised downward.

The military should, realistically, assume that the special registration legislation will expire on June 30, 1955. They should, therefore, begin now to adjust to that eventuality. In June 1955 approximately 2,200 dental graduates will, as a result of their regular Selective Service liability, become subject to active military service. Each succeeding class will provide at least that many military eligibles. By June 30, 1955, furthermore, the personnel strength of the military will have been streamlined to slightly more than 3,000,000. If the military were to reduce gradually the ratio of dental officers to military personnel to 1.5 per 1,000 by June 30, 1955, the resulting average strength of about 4,500 dental officers could readily be maintained from the annual increment of dental graduates

with regular Selective Service liability.

Other considerations have arisen recently which should put the military on notice that the 1.9 ratio should be adjusted downward. Legislation will be presented to the 83rd Congress in connection with the military's dependent care program. That legislation, according to indications, will adhere to the recommendations of a Department of Defense commission which studied and reported on the military's dependent care program. The Moulton Commission, as it is popularly known, recommended, in effect, a considerable reduction in the scope of the military's dependent dental care program. If legislation is enacted to that effect, a reduction in dental officer strength commensurate with the reduction in dental services might well be warranted.

Finally, the philosophy behind the Department of Defense's "new look" at military manpower needs assumes that the military might of this nation will not be reduced because of the contemplated reductions in military personnel. A more efficient use of military manpower is to be the compensating factor. The Association believes that the military dental program might be a suitable focal point for the "new look."

COUNCIL ON DENTAL EDUCATION

1953-54 Dental Students' Register

The Council on Dental Education has recently published the *1953-54 Dental Students' Register*. The data presented were obtained through a survey of the 43 dental schools, 31 dental hygiene schools, and 4 dental laboratory technician schools in the United States.

Enrollment figures presented in Table 1 show the rise in undergraduate enrollment over the past several years. On October 15, 1953, there were 12,516 undergraduate students enrolled in the dental schools, an increase of 146 students over the same date last year, and 72 per cent more than were enrolled in 1945. The establishment of four new dental schools since 1946, the expansion of training facilities in many of the dental schools, and the reduction of student mortality through the use of improved selection procedures are among the factors which have contributed to the rise in student enrollment.

A review of earlier editions of the *Dental Students' Register* shows there has been a steady increase in the number of students enrolled in graduate programs in the dental schools. The number of graduate students enrolled in each year from 1945 to 1953 is shown in Table 2.

Although only six of the dental schools require more than two years of predental training, 78 per cent of those currently enrolled in all schools had completed three or more years of predental

Table 1 • Number of undergraduate students enrolled in dental schools and number of graduates, 1945-1953

Year	Number of undergraduates enrolled	Number graduated
1945	7,274	3,212
1946	8,287	2,666
1947	8,996	2,225
1948	10,132	1,755
1949	11,336	1,574
1950	11,891	2,565
1951	12,169	2,830
1952	12,370	2,975
1953	12,516	2,945

work and 45 per cent had bachelor's, master's or other degrees before beginning their professional courses. Thirty-six per cent of the 1953 graduates had earned bachelor's or other degrees prior to enrollment in dental school. Twenty-four per cent of the 1952 graduates had such degrees.

The place of residence of undergraduate dental students by state, territory or foreign country is presented. There are 12,206 students from various states, 163 from the possessions of the United States, 41 from Canada and 106 from other foreign countries. There are 117 women students enrolled in the present undergraduate dental school classes. Postgraduate enrollment during all or any part of the 1952-53 school year was 4,131.

In one of the 43 dental schools an accelerated program is required of all students, and in one school the accelerated program is optional. Scholarships for undergraduate students are available in 24 schools.

Table 2 • Number of dental students enrolled in graduate programs in the dental schools, 1945-1953

Year	Number of schools in which graduate students were enrolled	Number of graduate students enrolled
1945	6	67
1946	11	100
1947	12	183
1948	16	204
1949	19	282
1950	23	349
1951	22	299
1952	23	280
1953	26	332

As shown in Table 3, there are currently 1,794 students enrolled in 31 dental hygiene schools. There has been a steady increase in the number of graduates of these schools in recent years and this trend may be expected to continue. Twenty-six schools had graduating classes in 1953, 29 will have graduating classes in 1954, and 31 will have graduating classes in 1955.

Table 3 • Number of undergraduate students enrolled in two year dental hygiene programs and number of graduates, 1949-1953

Year	Number of undergraduates enrolled in dental hygiene program	Number of graduates
1949	1,014	431
1950	1,377	449
1951	1,558	575
1952	1,676	675
1953	1,794	727

All of the dental hygiene schools require the applicant to have completed satisfactorily at least a high school course and three schools have established minimum admission requirements of two years of liberal arts training. Twenty-seven per cent of the 1,010 freshman students enrolled in dental hygiene courses in October, 1953, had one or more years of college training and 16 per cent had two or more years of college training before beginning their study of dental hygiene.

Other information contained in the *1953-54 Dental Students' Register* includes admissions requirements, admission and graduation dates, and tuition costs for the four-year program. Copies are available on request from the Council on Dental Education.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Family dental survey
III. Dentures and bridges worn; knowledge of fluoridation; opinion of the dentist

Housewives who filled out questionnaires in this survey were asked to indicate the number of dentures and bridges worn by members of the family. As shown in Table 14, about 25 per cent of all males and 30 per cent of all females wore some type of denture or bridge. About 3 per cent of persons in the 15 to 19 age category had at least one artificial tooth; this percentage increased to about 40 in the age group 40 to 49 and to about 60 in the age group 50 to 59. Among persons 60 years of age and older, about two out of three men and four out of five women wore at least one denture or bridge. Among the older people who wore dentures, the large majority wore at least one complete denture.

In most age groups, a considerably larger proportion of women than of men wore complete or partial dentures or removable bridges. The difference was greatest in the figures for complete upper and lower dentures in age group 30 to 39, in which the proportion of women was more than twice the proportion of men. The finding in this survey that more women than men wear dentures is consistent with the finding in the Survey of Needs for Dental Care that among dental patients more men than women were in need of dentures.

The number of persons wearing three or four bridges was negligible and was therefore omitted from Table 14. Rows of percentages in Table 14 add to more than 100.0 per cent because some people wore more than one type of denture or bridge.

About four out of five respondents answered "yes" to the question, "Have you ever heard of water fluoridation?" To the question, "Does your community have water fluoridation?" 17.5 per cent answered in the affirmative. Records kept by the Council on Dental Health show that currently about 10 per cent of the population is drinking fluoridated water. It seems likely that some of the people living in areas with natural fluoride-bearing waters may have answered "yes" to the latter question. Also, some affirmative replies may have been received from communities which had approved but not started fluoridation.

Housewives who said their communities were fluoridating their water supplies were asked, "Please explain what you think water fluoridation is." About 28 per cent answered this question correctly and fully by stating a chemical was added to the water supply to prevent or help prevent tooth decay. Another 21 per cent stated that fluorine or "a chemical" was added to the water supply but made no reference to control of dental caries. Another 9 per cent mentioned "prevention of tooth decay" without referring to the addition of fluorides to the water supply. In a sense, all of these replies might be construed as correct as far as they go, but some of them were incomplete. About 23 per cent said fluoridation was "purification of water," 16 per cent gave other incorrect replies, and 3 per cent said they didn't know what

The first and second articles on this survey appeared in the November 1953 and January 1954 issues of The Journal.

Table 14 • Percentage of family members wearing dentures and bridges, by age and sex

Age	Number of partial dentures and removable bridges				Number of fixed bridges				Complete upper denture		Complete lower denture		No dentures or bridges	
	One		Two		One		Two							
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
–4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	100.0	100.0
5–9	.4	.0	.0	.0	.2	.0	.0	.0	.0	.4	.0	.2	99.4	99.6
10–14	.3	.0	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	99.4	100.0
15–19	1.5	2.0	.0	.0	.0	.0	.0	.3	1.5	.3	.8	.3	97.1	97.1
20–29	6.7	4.8	1.0	.5	5.4	4.1	.5	.7	4.0	5.2	3.0	2.7	82.6	84.4
30–39	9.0	9.0	1.8	1.4	5.6	4.8	1.1	1.5	8.5	17.6	4.9	10.8	74.8	66.8
40–49	11.7	12.3	2.1	4.4	3.5	3.3	.8	.8	21.1	28.1	14.4	16.2	61.8	56.2
50–59	9.1	12.8	3.9	6.2	3.1	4.3	1.8	1.6	40.5	45.5	32.1	31.3	44.7	35.9
60–	10.6	14.0	3.1	5.0	2.0	2.3	.8	1.4	57.9	62.5	47.2	47.7	31.1	21.5
All ages	5.9	6.9	1.4	2.2	2.5	2.4	.6	.6	15.7	21.1	12.0	14.2	75.5	69.5

fluoridation was, even though they knew their community had it.

As shown in Table 15, nine questions were asked regarding the respondent's opinion of her dentist. The answers indicated that dentists are regarded highly by their patients. The fact that the questions were all phrased positively may have tended to encourage an affirmative answer from those respondents who did not have strong convictions either way.

The highest percentage of "yes" answers were made to questions relating to the cleanliness of the dentist and his office and to the quality of his work. The highest percentage of "no" answers were made to questions relating to reasonableness of fees and to whether the dentist gave instruction in home care of the teeth. Although fewer respondents answered "yes" to the question on reasonableness of fees than to any other question, there were almost six times as many affirmative as negative answers to this question. It is understandable that a relatively high percentage of respondents held no opinion as to whether the dentist was well informed on scientific developments in dentistry.

Following the nine specific questions regarding the respondent's opinion of her dentist, a space was provided in which the respondent was told to "please feel free to write in any comments about your dentist and anything about dentistry." A total of 281 reasonably distinct comments was entered by 217 respondents.

Of these 281 comments, 26 were to the effect that the dentist handled child patients ably, 18 that he was considerate of the patient's comfort and feelings, 10 that he was a friendly person or had a pleasant personality, 9 that his fees were reasonable, and 60 were other favorable comments about the dentist or dentistry. On the critical side, 36 comments were

Table 15 • Percentage distribution of replies to nine questions regarding respondent's opinion of the dentist

Question	Yes	No	No opinion	Total
He is considerate of the patient's comfort and feelings	94.9	1.6	3.5	100.0
He tells the patient how to care for his teeth at home	87.5	9.9	2.6	100.0
He explains to the patient the reasons for the treatment he is providing	90.1	6.9	3.0	100.0
His fees are reasonable	80.1	14.4	5.5	100.0
His office is neat and clean	97.9	.6	1.5	100.0
He keeps himself clean and neatly dressed	98.4	.3	1.3	100.0
He is well informed on scientific developments in dentistry	87.5	1.1	11.4	100.0
His work is well done	96.1	.9	3.0	100.0
His chairside assistant is efficient	94.3	1.7	4.0	100.0

to the effect that fees were too high, 8 that the cost of dentistry was difficult to meet (no apparent criticism of fees), 8 that too long a wait was required for appointments, 5 that there should be a payment plan similar to Blue Shield or Blue Cross, 5 that too little work was done by the dentist at each sitting and that too many sittings were required, 5 that the dentist was rough or inconsiderate of the patient's feelings, and 47 were other unfavorable comments about dentists or dentistry. The remainder of the 281 comments could not be classified as either favorable or unfavorable to dentistry.

This concludes the series of articles on the Family Dental Survey. It has been apparent that answers to some of the questions have indicated an imperfect memory or wishful thinking on the part of the respondent. This survey has, however, produced useful facts in several heretofore uninvestigated areas. The experience gained in this survey of the consumers of dental services will lead to refinements in future surveys.

B. Duane Moen, Director

JUDICIAL COUNCIL

Ethics

The Judicial Council of the American Dental Association is required to render many opinions and decisions each year. Some of these opinions afford interesting reading as well as guides to reasonable conduct. In publishing them, all parts are deleted that would identify the inquirers or those whose names may be associated with the controversy. The questions raised in the following inquiries are covered by the *Principles of Ethics* of the American Dental Association, copies of which may be secured by writing to the Central Office of the Association.

DISTRIBUTION OF BOOKLETS ON DENTAL HEALTH

Question • I have received from the Association several sample booklets on dental health education. If I ordered some of these materials, could I distribute them to my patients by mail, or are they to be kept in the reception room to be taken by the patients? Would mailing them be a violation of the *Principles of Ethics?*

D.D.S., New York

Reply • It is the opinion of the Judicial Council that no question of ethics would be involved if you kept available in your office certain educational pieces, such as those furnished by the Association or those that earn the stamp of approval of the Council on Dental Health. Such practices are urged by the Association.

However, many pieces of literature that come to a dental office contain not only the advertising of some dental product but may have information of questionable value—and even go so far, in

some cases, as to have imprinted the name of the dentist in whose office they are being distributed. This we do not feel is good propriety on the part of a dentist.

You ask the question, "Would mailing be a violation of the *Principles of Ethics?*"

No, we do not feel such practice would constitute a direct violation of the *Principles of Ethics* of our profession, unless the pieces of literature carried your name and office location in some form.

However, we do not see the necessity for such a procedure, especially if the material which you wish your patients to receive is kept readily available in your waiting room, or if your secretary is instructed to see that your patients receive one when they come to your office.

Perhaps, if you feel you would like to mail out this literature, it could be included in the recall letters which you probably send periodically to your patients. In this way you would be sending only to your regular patients.

Judicial Council

ANNOUNCING SPECIALTY PRACTICE

Question • I have been practicing in this town for more than 30 years, and as I now have my son in the office, I would like to limit my practice to prosthetics. How can I announce it? Can I put cards in the newspapers serving this territory? If so, what standards apply to this announcement?

D.D.S.

Reply • It would be inadvisable on your part to put announcements to this effect in the local press. Section 15 of the *Principles of Ethics* of the American Dental Association is very specific in this matter. It states:

> A dentist may properly send announcement cards when there is a change of location or an alteration of the character of practice. Such announcements may be sent only to dentists, members of other health professions or to patients of record. The style and text of such announcements shall be consistent with the dignity of the profession and with the custom of other dentists in the community.

We would suggest a nice card, 3 by 5 inches or 4 by 6 inches, sent out in accordance with the intent of this section. On this card you would include your name and office address and would state that you were discontinuing the practice of general dentistry to limit your practice to the field or specialty of prosthetics.

Judicial Council

ETHICAL SIZE FOR SHINGLE

Question • Please send me information on the ethical size of an outside shingle and number for my office.

D.D.S., Pennsylvania

Reply • There is nothing specific in the Association's *Principles of Ethics* as to the exact size of "an outside shingle and number" for your office. Usually your local State Dental Practice Act regulates this pretty well, as to size of letters to be used in your name and over-all size of the sign.

Also, the location of your office in relation to the public thoroughfare might alter the size sign you would use. If your office entrance were directly off the street, you probably would not care to use the same type sign as you would if your office were 40 or 50 feet from the sidewalk.

We suggest that you consult the ethics committee of your local dental society for advice. Enclosed is a copy of *Principles of Ethics.* You will note from carefully reading Section 14 that the American Dental Association is quite liberal in this respect.

Judicial Council

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The following 16 mm. films constitute the dental health and technical film collection now being circulated by the Film Library at a nominal rental fee of $2.50 for each film. Since the number of prints of each title is necessarily limited, it is suggested that dental society program chairmen and other professional and nonprofessional film borrowers plan their programs far enough in advance to insure availability.

More specific information on these films can be obtained from the Film Library.

DENTAL HEALTH FILMS (NONPROFESSIONAL USE)

For Community and Civic Groups •

A Career in the Profession of Dentistry
Come Clean
Story of the American Dental Association
Swab Your Choppers
A Drop in the Bucket (fluoridation)
Fluoridation
The Fluoridation Story
Target: Tooth Decay (fluoridation)

Grade School •

Dental Health: How and Why
It's Your Health
Save Those Teeth
Taro's Adventure in Health
Teeth Are to Keep
Winky, the Watchman

High School and College •

A Career in the Profession of Dentistry
Swab Your Choppers

Parents •

About Faces
The Child and His Thumb
Dental Health: How and Why
Your Child's First Visit to the Dentist

Patient Education •

Facial Changes
Good Dentistry Can Improve Your Appearance
How to Use Artificial Dentures
The Life of Your Artificial Dentures
Partial Dentures and Bridges
Toothbrushing for the Periodontal Patient

Vocational Guidance •

Career in the Profession of Dentistry
Dental Assistants — Their Effective Utilization

TECHNICAL (PROFESSIONAL USE ONLY)

Anatomy and Physiology •

Bone Graft and Plating of the Mandible
Correction of Deformity of the Jaws
Intra-Oral and Pharyngeal Movements
Local Anesthesia in Dentistry
The Physiology of Mastication

Anesthesia •

Disaster Anesthesia
Local Anesthesia in Dentistry
Operative Anesthesia
Operative Hypnodontics
Vinethene in Dentistry

Dental Materials •

Dental Amalgam: Failures Caused by Moisture Contamination
Denture Resin
Silicate Cement
Silicate Cement Restorations

Dentures •

(See *Prosthodontics*)

Diagnosis •

Examining the Oral Cavity
Oral Cancer: The Problem of Early Diagnosis
Principles of Biopsy

Endodontics •

Endodontia and Immediate Apicurettage
Pulp Canal Therapy
Root Canal Therapy

Ethics and Jurisprudence •
Prevention of Malpractice Claims

Exodontics •
Complicated Exodontia — Introduction
Removal of Impacted Teeth
Removal of Impacted Third Molar
Use of Elevators for Removal of Roots and Teeth

Fractures •
Skeletal Fixation for Fractures of the Mandible
Treatment of Jaw Fractures

History of Dentistry •
Story of the American Dental Association

Implant Dentures •
Surgical Implant Technique

Occlusion •
(See *Prosthodontics* and *Orthodontics* for other suitable films on this subject.)
Biologic Approach to the Periodontal Problem
The Child and His Thumb
Correction of Anterior Open Bite
Correction of Deformity of Jaws
Hydrostatic Impressions
Mandibular Prognathism
Occlusal Equilibration
Periodontia
Practical Preventive Orthodontics
Radiography of the Temporomandibular Articulation
Temporomandibular Disturbances
Treatment of Jaw Fractures

Operative Dentistry •
Dental Amalgam: Failures Caused by Moisture Contamination
A Method of Mixing Silicate Cement
Operative Dentistry (series)
Manipulation of Matrices
Rapid Curing Plastic Inlays
Silicate Cement Restorations
A Technic for Amalgam Restoration

Oral Hygiene •
(These films are suitable for use by military personnel.)
Duties of a Dental Technician
Oral Prophylaxis by Dental Technicians

Oral Surgery •
Alveolectomies for Symmetricity
Bone Graft and Plating of the Mandible
Complicated Exodontia — Introduction
Correction of Deformity of Jaws
Cranioplasty Using Acrylic Plates
Cysts
Early Care of Plastic Surgical Cases
Endodontia and Immediate Apicurettage
Mandibular Prognathism
Practical Procedures in Oral Surgery
Preparation of the Mouth for Dentures
Principles of Biopsy
Removal of Impacted Teeth
Removal of Impacted Third Molar
Ridge Extension of the Maxilla
Skeletal Fixation for Fractures of the Mandible
Surgical Implant Technique
Surgical Preparation of the Mouth for Ridge Extension
Treatment of Jaw Fractures
Use of Elevators for Removal of Roots and Teeth

Orthodontics •
Correction of Deformity of Jaws
Mandibular Prognathism
Practical Preventive Orthodontics
Radiography of the Temporomandibular Articulation
Temporomandibular Disturbances

Partial Dentures •
(See *Prosthodontics*)

Pathology •
Biologic Approach to the Periodontal Problem
Examining the Oral Cavity
Oral Cancer: The Problem of Early Diagnosis
Periodontia
Principles of Biopsy
Temporomandibular Disturbances

Pedodontics •
The Child and His Thumb

Periodontics •
Biologic Approach to the Periodontal Problem
Oral Rehabilitation
Periodontal Surgery — Electrosurgical Gingivoplasty
Periodontia
Surgical Elimination of the Periodontal Pocket
Toothbrushing for the Periodontal Patient

Prosthodontics •
Acrylic Jacket Construction
Acrylic Jacket Crown Construction

Alginate Impressions for Indirect Inlays
Casting of Dental Gold Alloys
Centrimetric System for Denture Construction
Complete Dentures — Alginate Impressions
Conservative Approach to Immediate Denture Prosthesis
Construction of Maxillary Anterior Fixed Bridge
Construction of Partial Maxillary and Mandibular Dentures
Dentistry — Anterior Acrylic Bridgework
Factors Concerned in the Construction of Full Mandibular and Maxillary Dentures
Forming and Firing a Porcelain Jacket Crown
Interchangeable Duplicate and Triplicate Dentures
Partial Dentures — Biomechanics
Porcelain Jacket
Preparation of the Mouth for Dentures
Ridge Extension of the Maxilla
Surgical Implant Technique
Surgical Preparation of the Mouth for Ridge Extension

Roentgenology •
Physiology of Mastication
Radiography of Temporomandibular Articulation
Temporomandibular Joint Disturbances

Root Canal Treatment •
(See *Endodontics*)

COUNCIL ON DENTAL RESEARCH

List of certified dental materials

Since the publication of the most recently revised List of Certified Dental Materials (revised to November 15, 1953), the following materials which conform to American Dental Association Specification No. 1 have been added.

CERTIFIED AMALGAM ALLOYS
(A.D.A. SPECIFICATION NO. 1)

Alloy	*Manufacturer or distributor*
Gem Alloy	Certified Dental Supply Corp.
White Beauty, Fine Cut	Lang Dental Manufacturing Company

Swedish report on sugar and dental caries: findings and recommendations of the Royal Board of Sweden

A circular issued recently by the Royal Medical Board of Sweden contains information and recommendations regarding dental caries and the consumption of sweets. Research on this subject by the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association (see THE JOURNAL of October, 1953) has aroused so much interest among readers that it is felt that an abstract of the Swedish report also will be of interest and value. Translation from the Swedish was made by Thure Brandrup-Wognsen of Stockholm.

During the last decade scientific investigation (into the causes of dental disease) has been intensified.

It has been possible to show, especially by means of animal experiments—a comprehensive literature already exists—that dental caries is determined, in different ways, by variations in diet or environmental conditions. The effect of the use of fluorine on the frequency of dental caries in the individual, group or country is now a question of primary importance.

Modern basic research has helped to elucidate the function of sugar in producing acids which are a contributory cause of the dissolution of the calcium salts in the enamel at the places attacked on the surfaces of the teeth and which thus give rise to the formation of cavities.

For a considerable time a severe form of dental decay has been known as "baker's caries." The picture of this type of dental caries differs considerably from the normal type inasmuch as even the surfaces which, in the majority of cases, are not affected by the disease exhibit numerous lesions, some of which are very severe.

It has been assumed that this result is connected with the intensive fermentation of carbohydrates in the oral cavity, especially when the action is due to frequent excessive amounts of sugar and diffused fine flour, giving the saliva a high sugar content. Under these circumstances, the acids then injure even surfaces that are thoroughly washed by saliva. Experiments with animals have also shown that under certain conditions a diet with a high sugar content may cause an increase in the frequency of caries. At present particular attention is paid to animal experiments that are conducted in order to investigate the interaction between the consumption of sugar and the supply of fluorine, as sugar promotes and fluorine prevents dental caries. In different countries the consumption of sugar, particularly the consumption of sweets by children, has been the subject of numerous propaganda campaigns conducted primarily by dentists, physicians and teachers who considered that their experience had taught them the dangers involved in this consumption of sugar.

The Medical Board (of Sweden) started comprehensive investigations which were carried out for a number of years at the Vipeholm Hospital at Lund.

The heads of the Odontological Experimental Station attached to the Medical Board give a short summary of the conclusions reached. These conclusions either have been confirmed experimentally or are considered to possess a high degree of probability. In essence they are:

1. These investigations have definitely shown that under certain circumstances sugar can cause an increase in tooth decay in human beings.

2. In this connection, the type of foodstuff containing sugar plays a more decisive part than the actual quantity of sugar. Thus there is a great risk of increased caries activity if the sugar is taken in a sticky form, and the risk is considerably augmented if it is taken in this form a great number of times during the day. What proves decisive in determining whether a foodstuff will be liable to give rise to caries activity is the length of time, during consumption, that it is in contact with the surface of the teeth.

3. The Vipeholm investigations (showed) that the caries activity which increased as the result of such a consumption of sweet

stuffs decreased when consumption ceased, and within a year it had returned to the initial amount. Other series of investigations show that we cannot expect that caries will entirely disappear even if the supply of sugar is very considerably reduced.

4. The significant variations in individual reactions in connection with the consumption of sugar have also been observed in the Vipeholm investigations. Consequently, a prognosis of the results of prophylactic measures against caries in individual cases must be made with a certain degree of caution.

The Medical Board wishes to appeal to all physicians, dentists, hospital nurses, dental nurses and other members of medical staffs to take an active part in combating dental caries.

Children above all, but also adolescents and adults, should be taught to consume less sweets. Sticky, tough sweet stuffs, that are retained for a long time in the mouth or that require constant sucking, licking or chewing, should be avoided altogether.

The consumption of sweet stuffs should never take place at the end of the day—it is preferable that it should form part of one of the principal meals.

Special attention should be paid to cases where there is a tendency for what is known as "baker's caries" to develop. It is important for dentists to follow particularly the cases where the frequency of dental caries displays a manifest and rapid increase. These cases should be treated by physicians and dentists in collaboration.

Engel, Björkquist, Maunsbach, Thourén (The Dental Department of the Royal Medical Board).

The Scientist's Responsibility to Society • We may well raise the question, "What is the responsibility of the scientist to society?" The question has been the result of much discussion on the part of both scientists and non-scientists. The answers range from one extreme to another. On the one hand we find those who advocate a moratorium on scientific activity as did the Bishop of Ripon when he declared in 1927, ". . . the sum of human happiness outside scientific circles would not necessarily be reduced if for ten years every physical and chemical laboratory were closed and the patient and resourceful energy in them transferred to recovering the lost art of getting on together and finding the formula of making both ends meet in the scale of human life. . . ." Contrasting with this negative approach to dealing with the impact of science on society there is the irresponsible exploiter of applied science who holds that man is by nature a competitive creature so he must be left free to do as he wishes. This person insists that the scientist has no responsibility to society—or may even insist that the scientist's responsibility is to keep out of social affairs so that commercial success can be left solely to, "the play of the market place," to quote a currently well-known Secretary of Commerce. *Aaron J. Ihde, "Responsibility of the Scientist to Society," The Scientific Monthly, 77:244 November 1953.*

LON W. MORREY, D.D.S., EDITOR

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Longevity in dental journals: Dental Items of Interest ends long career

With tne demise of *Dental Items of Interest* in the seventy-fifth year of its life, December 1953, the oldest dental journal in the United States and nearly the oldest in the world, passed out of existence. From its inception, *Items of Interest* was a journal largely expressing the personality of its editor. This reflection of character was especially true in the case of Rodrigues Ottolengui, editor from 1895 to his death in 1937, whose "Around the Table" department gave a distinctive flavor to the journal and reflected the special interests of its author.

At the time *Items of Interest* ceased publication, two French journals whose seniority was a matter of months—*Revue Odontologique* and *L'Odontologie,* both founded in 1879, also lost their identity by being merged with two younger journals in the *Revue Française d'Odonto-Stomatologie.* With these suspensions of publication, the *British Dental Journal,* the first number of which was published in April 1880, became the oldest dental journal in the world. In America, the *Texas Dental Journal,* founded in February 1883, is now earliest among existing journals; and among current national publications in the United States, the proprietary journal, *Dental Digest,* established in 1895, is oldest.

Longevity in dental journals has been limited to about seventy-five years. Only the *Dental Cosmos,* with a life span of seventy-nine years, from 1859 to 1938, and the *Dental Register,* which lasted from 1847 to 1923, seventy-seven years, have exceeded this time. No European journal now published has been in existence so long, and it is doubtful that any of the past has equaled these records.

Second enrollment period for accident and health insurance open: members urged to apply early

During the original enrollment campaign of the Association's accident and health insurance program late in the fall of 1952, a number of applications was returned to members of certain state dental societies because the applications did not meet the underwriting requirements of the insuring company. Such returns would not have occurred had half or more of the state dental society membership or half of the Association's membership applied for the insurance. The insurance agreement stipulates that at least fifty per cent of the members of a state dental society or the national dental society must be enrolled in the plan in order that the physically impaired as well as the physically fit applicants may receive policies.

The House of Delegates of the Association has approved the recommendations of the Council on Insurance to open another enrollment campaign in an effort to provide the insurance protection most members desire. This enrollment period opened February 1 and will extend to April 30. The member whose original application was returned is requested by the Council on Insurance to submit a new application during this enrollment period. The application—but no money—should be sent to Paul W. Zillmann, insurance trustee, 29 Walden Avenue, Buffalo, New York.

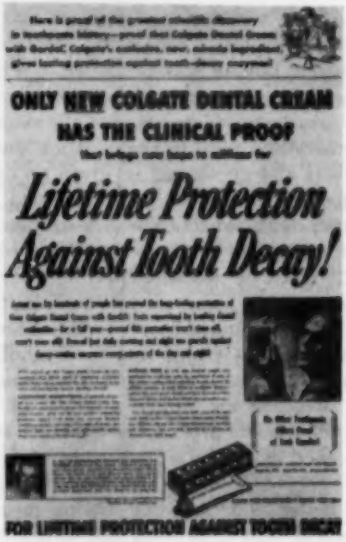
To make the benefits of this insurance program available to those who need them most the Council requires only a small number of additional applications. If every member whose original application was returned will reapply, their combined efforts will constitute a substantial percentage of the Council's goal. It is important that members send in their applications now and that they urge their friends to do likewise in order to bring the present enrollment campaign to a successful conclusion.

Receipt of applications during the early stages of this enrollment campaign will assure early processing and guarantee delivery of insurance certificates—contingent, of course, on attaining quotas—promptly after May 1, 1954.

Responsible advertising authorities deplore irresponsible advertising

Members of the dental profession are not alone in deploring the rash of ridiculous claims and implications promised the American people by the promoters of several dentifrice products. That reputable leaders in the advertising profession also are concerned over these irresponsible utterances is evidenced by the two column comment published in the January 11 issue of *Advertising Age* and reproduced on the adjoining page through the courtesy of that magazine.

The Creative Man's Corner . . .


ONLY NEW COLGATE DENTAL CREAM
HAS THE CLINICAL PROOF
Lifetime Protection
Against Tooth Decay!
FOR LIFETIME PROTECTION AGAINST TOOTH DECAY

Hope Springs Illusive

This Colgate Dental Cream advertisement is, in our opinion, an outstanding example of how to create callouses on the human mind so that, eventually, it becomes insensitive to all advertising.

What it says—Lifetime Protection Against Tooth Decay—is true within limitations set by other words elsewhere in the ad. "Daily morning and night use," for example. And "brings new hope to millions" (but not necessarily to *you*). The very hope it holds out, however, is illusory in the extreme.

The third paragraph of the copy explains that the results of clinical tests on *"over nine hundred* people . . . showed *the greatest reduction* in tooth decay in toothpaste history—proved that *most* people *should now have far fewer cavities* than ever before." The italics are ours.

A box explains that "a jury of distinguished dentists has examined the evidence." But nowhere is the jury listed. And, of course, nowhere are the actual results of the tests stated.

This ad will undoubtedly sell a whopping amount of Colgate Dental Cream. And maybe this is enough to make the advertiser and the agency feel elated and well satisfied with themselves. Maybe, too, we are over-solicitous about not only the moral principles involved but the responsibility of an advertiser and an agency to the profession they practice.

However, if we were an advertiser attempting honestly to sell our product against competitive products, we would raise particular hell about this ad. We would raise it because we would feel the shrewd and calculated presentation of the "facts" in this advertisement could only work to the detriment of all advertising, including ours. Legally it might stand up. But, in the long run, we feel the acceptance of advertising statements requires more than simply staying within the law. We feel it requires a deeply and sincerely felt determination not to play anybody for a sucker.

Courtesy of Advertising Age. Reproduced from January 11, 1954, issue

Holland host to the Fédération Dentaire Internationale in June

The forty-second annual session of the Fédération Dentaire Internationale will be held this year in Scheveningen, famous seaside suburb of The Hague, Holland, June 8-13. American dentists who are planning a trip to Europe this summer will want to arrange their itinerary so as to take advantage of the event. Ordinarily the annual sessions of the F.D.I. are devoted only to organization and administrative affairs. This year, however, members and guests will be given an opportunity to participate in an unusual and extensive scientific program provided by a Congress or joint meeting of three Netherlands dental societies held in conjunction with the Fédération —the Nederlandsch Tandheelkundig Genootschap, Vereeniging van Nederlandsche Tandartsen and the Nederlandsche Maatschappij tot Bevordering der Tandheelkund. The scientific program of the Congress will be held in Holland's famous Kurhaus-Concert Hall which will be equipped with facilities for the simultaneous translation of essays in French, English, German and the Scandinavian languages.

Although only a comparatively small number of American dentists can avail themselves of the privilege of attending the annual meetings of the Fédération Dentaire Internationale, all ethical dentists can profit from the other activities of that organization, all of which are designed to advance the science of dentistry.

The Fédération Dentaire Internationale was founded in 1900 for the principal purposes of promoting a better understanding among members of the dental profession throughout the world and improving the dental health standards of all nations. This it does by holding international congresses or meetings at five year intervals, aiding nations to strengthen their national dental organizations, stimulating the exchange of ideas and scientific information by publishing an *International Dental Journal* and a periodic news letter and, most importantly, by cooperating with other international health and scientific organizations. The Fédération, for example, is the official representative of dentistry in the World Health Organization.

The Fédération Dentaire Internationale is financed primarily by dues paid by member national dental organizations and by contributions received from individual dentists who enroll as supporting members. Members of the dental profession who wish to contribute to and benefit from the Fédération may do so by subscribing for a supporting membership. Supporting memberships, including a subscription to the *International Dental Journal,* which is published quarterly, may be secured by applying to Philip E. Adams, U.S.A. National Treasurer of the F.D.I., 170 Marlborough Street, Boston.

The Fédération Dentaire Internationale, profiting from fifty years of slow but steady growth, now plays an important part in the health administrative affairs of the world. Dentists, by becoming supporting members, can make it play an important part in their professional careers.

Washington News Letter

Military dental affairs are very much in the Washington spotlight. Perhaps the most interesting development in recent weeks is the Army's decision to accept applications this spring from senior dental students prior to their graduation. Announcement of this innovation came in mid-February. The Army's liberalization of policy means that students in this year's graduating classes may receive Army Dental Corps commissions at their convenience and can know exactly when they will go on active duty. Detailed information has been forwarded to deans of all dental schools and to schools of veterinary medicine, whose students are being offered the same opportunity.

THE ARMY PROGRAM

The various Army quotas are as follows (totaling 330): First Army, 36; Second Army, 93; Third Army, 33; Fourth Army, 20; Fifth Army, 112; Sixth Army, 36.

March is the application month. Applicants must volunteer for two or three years of active duty. In filling the quota, preference will be given to men deemed most vulnerable to induction and to those volunteering for three years' duty rather than for two.

Senior students graduating in May or June of this year who wish to participate in this program will notify the Army Surgeon General. He will forward their names to commanders of the respective armies. Forms will be sent to the applicant by the Army commander.

Upon completion of application forms, students will submit the forms to their deans, who will transmit them to the Army commander along with a letter stating whether applicant is morally and professionally qualified to practice dentistry and verifying that May or June will be graduation month.

On April 23, Army commanders will inform the Army Surgeon General as to whether their respective quotas are filled and, if not, how many vacancies exist.

"Qualified applicants who are not selected for appointment because of quota restrictions," says the Army directive, "will be so notified by the appropriate Army commander on or about 14 May, 1954. Such applicants will also be advised that under current policy of the Department of Defense and the Selective Service System, they will have ample opportunity to obtain a commission in one of the armed forces prior to being inducted under the Universal Military Training and Service Act, as amended. . . . They will also be informed that failure of selection in connection with this program does not preclude their applying for appointment and active duty in one of the armed forces in connection with other programs."

The new system, designed primarily as a convenience to draft-vulnerable dentists who wish to finish their obligated military service as soon as possible, is not applicable to dental or veterinary seniors due for commissioning on graduation as a result of ROTC membership.

THE DOCTOR DRAFT LAW

Another military dental development concerns Department of Defense planning against the day—specifically, June 30 of next year—when the doctor-draft law expires. The office of Dr. Frank B. Berry, assistant secretary in charge of health and medical affairs, is working out details of a tentative "matching plan" which is intended to draw younger physicians and dentists into the Armed Forces on an orderly, systematic basis.

Beginning next year, senior medical and dental students would inform their deans (1) of their preference for service in Army, Navy or Air Force, and (2) preference as to time for embarking on active duty. The government's objective is to permit a certain number of dental graduates to continue through internship and others to take one or more years of residency training before they are called into uniform. Still others would go on active duty right after graduation.

Military requirements, local community requirements and preferences of the individuals themselves would all be considered under this type of matching plan. To work properly, it would require cooperation of the professions and teaching institutions, as well as of such government agencies as Selective Service, Office of Defense Mobilization and the Armed Forces.

In the meantime the doctor-draft is still on the law books and continues to present complications to vex the Army. In February, a federal appellate court in North Carolina overruled a lower court decision unfavorable to an inducted dentist, Pvt. Herbert Nelson. Pvt.

Nelson sought to force the Army to discharge him on the grounds that it had failed to grant him a commission to which he believed himself entitled. The inductee's legal victory stemmed from the fact that Public Law 84, the new doctor-draft law as amended in 1953, specifies that persons inducted under its provisions shall receive rank commensurate with their professional training and their experience.

The appeals court found that the Army private was duly qualified, professionally, for a commission and, therefore, should receive one or be discharged from service. The Army had not commissioned him because it considered that his background was questionable from the standpoint of security.

Presently serving in enlisted ranks are more than 20 physicians and dentists. Most of them are noncommissionable for loyalty-risk reasons, and there are a few who have declined commissions for religious and other principles. Unless the government appeals the Nelson case and wins in the Supreme Court, the Army apparently will have no alternative but to grant discharges to all of these 20-odd men.

International Correspondence

NEWS FROM GREAT BRITAIN

On January 29 and 30 the Representative Board of the British Dental Association, consisting of 120 members representing the 20 branches of the Association had its first meeting in 1954 at Association headquarters in London. Many subjects of the greatest importance to the future of dentistry in Great Britain were discussed. W. Stewart Ross reports as follows:

Ancillary Workers • It appears to be certain that so far as British dentistry is concerned, a momentous page in its history may be written in the near future. I refer to the proposed new Dentists' Bill which, although containing clauses of undoubted benefit to the dental profession, such as the setting up of an independent Dental Council to insure self government by the profession for the first time, provides for an experiment along the lines of the well known New Zealand dental nurses' scheme. According to this plan women will be trained for two years to extract and fill deciduous teeth under the supervision of dentists.

The British Dental Association from the beginning has disapproved strongly of those clauses in the bill which deal with the creation of ancillary workers. Realizing, however, that the Minister of Health intends to introduce the Dentists' Bill in Parliament as soon as parliamentary time permits and that in all probability the measure will go through, the B.D.A. has striven to minimize the dangers to the public which it thinks would result from such action.

To understand the divergence of views held by the Ministry of Health and the British Dental Association, it is necessary to appreciate the position of dentistry in Britain today. There is a ratio of approximately one dentist to 4,000 of the population, which, in a dentally conscious community, it must be admitted, would be lamentably low. Yet there are many dentists in England who are not fully employed. The answer is that as yet the masses are not educated to the value of oral hygiene and the necessity of regular dental treatment. In a great many cases the dental profession is providing a service of last resort, involving the extraction of teeth which have become hopelessly decayed or surrounded by advanced disease of the supporting structures as a result of apathy and neglect.

The Ministry's view is that, when the present population is taken into account and allowance is made for those without teeth, and for the mothers and young children who ought to have regular treatment, the number of dentists required is, in theory, between 40,000 and 50,000, (at present there are approximately 10,000 practicing dentists). It is an unfortunate fact that the majority of our dental schools are unable to find sufficient students of the requisite caliber to fill the available vacancies; and even if they were all filled to capacity, there would be no prospect of increasing the register to anything like the

number of 40,000. The Ministry therefore feels that there is a strong argument for the introduction of ancillary workers who could be trained to deal with children's teeth. The Ministry argues further that such a step would enhance the importance and status of dentistry; at least it would lead to a generation fully conscious of the importance of a healthy mouth, and this generation, on leaving school, would expect regular conservative treatment of the highest order from every available dentist.

How do the views of the British Dental Association conflict with those of the Ministry of Health? The B.D.A. sees in the introduction of dental ancillaries a serious threat to the status of the dental profession. If women are trained in two years to extract and fill deciduous teeth, the latter operation admittedly at least as difficult as that of filling permanent teeth, how can the profession expect to attract new students to the schools to embark upon a four or five years' course? Would it not be difficult for the population to differentiate between an ancillary worker and a qualified dental surgeon?

The more pertinent doubts held by the British Dental Association are that ancillaries might be allowed to operate without the personal supervision of a dentist, a state of affairs which exists in New Zealand; that the ancillary work may not be confined to the public services; that ancillary workers might be allowed to work eventually on adults; that there might be a provision in the bill, which when implemented could be construed as permitting additional types of ancillary workers to operate on the mouth; that the general practitioners may not have sufficient opportunities to voice their opinions regarding the assessment of the advantages or disadvantages of the proposed experiment in utilizing ancillary workers. The Dental Association asks the Minister of Health to make provision in the bill for safeguards, if the introduction of the bill is insisted upon.

The British Dental Association feels that the Ministry, although spending millions of pounds on a public dental service, has done little to foster research into the cause and prevention of dental disease, and little to educate the masses in the practice of correct oral hygiene, or to encourage recruitment to the profession.

The Association's views were not accepted when the National Health Service was introduced, at which time the Association insisted that prior consideration should be given to children and expectant mothers. Now, however, the present Minister of Health is anxious that the younger generation shall be properly cared for, and he sees in the introduction of ancillaries a prospect of achieving this end. The Association agrees wholeheartedly that something must be done to improve the present deplorable condition, but does not agree that the introduction of ancillaries is the best method of approach. Provided that the Minister will take into account the arguments put forward by the Association, which were advanced in order to safeguard the public, the Association, although disagreeing with the principle of ancillaries, may be expected to respect the spirit which lay behind the drafting of the Dentists' Bill.

Dental Research • Professor Martin Rushton, dealing with current research problems, writes that the Dental Committee of the Medical Research Council has recently undergone its periodic reconstitution. It has a majority of dental members and has also representatives of relevant branches of science and medicine. The Committee recommends grants for approved projects in dental research. There is considerable concern at the great shortage of research accommodations in dental schools, and indeed everywhere else in Britain which results from the restrictions on building and capital expenditure and the competition for existing space by teaching and clinical requirements. While interest in dental research has greatly increased since the war, and many promising workers are developing and can be furnished with adequate financial support, the provision of suitable working accommodations in connection with university departments is proving a matter of the greatest difficulty.

The next meeting of the British Section of the International Association for Dental Research will take place at Birmingham on April 2, and any members of other sections who may be in Britain at that time will be welcome.

Fluoridation • The Minister of Health has accepted the report of the United Kingdom Mission to North America concerned with the fluoridation of domestic water. It is expected, therefore, that the recommendations of that report will be implemented. They include preliminary investigations and the selection of suitable communities which will be regarded as study areas where fluoridation will be carried out, with control areas for comparison and periodic dental and medical surveys.

American Dental Society • Cyril de Vere Green writes of a recent meeting of the American Dental Society of London at which a paper was read by Geoffrey Slack of the department of children's dentistry at the University of Liverpool on "Dental Treatment for

the Under Five Year Olds." It is an important subject which can easily be pushed aside in a large general dental practice. One of the side issues in the North of England is an increase of labial cavities in upper deciduous incisor teeth, and one of the suggestions made was that this increase might be associated with a very marked consumption of iced lollies during the past three or four years. In some schools it has been ascertained that an average of three a day were consumed per child, and that the pH of a lollie is 3. The very small children are unable to get them into their mouths and rest them against the incisor teeth. Further investigation is being carried out before any pronouncement is made.

A custom has been established during recent years for an interchange of meetings between the American Dental Society of London and the American Dental Club of Paris. This year London is visiting Paris and our members will be taking over a number of table demonstrations. These exchanges are always most welcome, for they afford the opportunity of renewing old friendships, some of which were formed during undergraduate and postgraduate days in the same schools in the United States.

Items of General Interest • Our colleagues in the United States will be interested to learn that at a meeting of the Council of the Royal College of Surgeons of England on December 10, 1953 with Sir Reginald Watson-Jones, vice-president, in the chair, Dr. Fred W. Rankin, president of the American College of Surgeons, was awarded an Honorary Fellowship.

The experimental training of oral hygienists conducted by the Ministry of Health at the Eastman Dental Hospital came to an end in January. There are many reasons for this decision by the Ministry, which is to be regretted, and it is hoped that before very long, proper facilities for training dental hygienists will be available on a permanent basis.

A good friend to British dentistry, Col. Walter Waldorf, chief of Dental Division, United States Air Force in Great Britain, has to our regret completed his tour of duty and returned to the United States. Both in his official position and as a friend and colleague, Colonel Waldorf did much to strengthen the bonds of friendship and to increase the exchange of dental knowledge between our two countries.

G. H. Leatherman, D.M.D., F.D.S.R.C.S.

NEWS FROM AUSTRALIA

DENTAL TECHNICIANS

The problem of dental technicians' seeking status beyond their training and capacities has been increasing during the past 12 months or more, particularly in the States of Tasmania and New South Wales, where Labor parties hold the reins of Government. In Tasmania the proposals for increased status were rejected by the Government of that State. The picture in New South Wales is, however, rather clouded; a fact-finding committee appointed by the Minister for Health, representing certain interested parties, has been collecting information for some time. The result, if any, of this "fact-finding" has not as yet been made known.

Meanwhile, such problems of national importance as the fluoridation of community drinking waters and the establishment of an adequate dental service for school children and the preschool children in New South Wales—Australia's largest state—are neglected and even forgotten.

DENTAL STANDARDS BUREAU

For some years a Bureau of Dental Standards has been operating on a temporary basis as a unit of the Department of Health of the Commonwealth. Its duties and activities have been the investigation of dental materials and the establishment of appropriate standards for such materials. Its work has reached a high level and its findings have found world-wide acceptance. The Bureau has now become an integral part of the Commonwealth Department of Health on a permanent basis, and its future is assured.

Robert Harris, United Dental Hospital, Sydney

Association Affairs

A.D.A. REPRESENTATIVES STATE VIEWS ON LEGISLATION

Representatives of the American Dental Association were in Washington during the month of February to confer with government officials on proposed health legislation.

Paul E. Jones and Francis J. Garvey of the Council on Legislation testified before the Subcommittee on Independent Offices of the House Committee on Appropriations concerning proposed appropriations for Veterans Administration outpatient dental services. They asked for an increase of five million dollars for the outpatient dental program. They urged that appropriations be realistic in terms of the amount of outpatient treatment which would be required to reduce the existing backlog and make possible the handling of new applications on a reasonably current basis.

R. H. Friedrich, J. Claude Earnest, Bernard J. Conway of the Council on Federal Dental Services and Mr. Garvey met with Frank Berry, assistant secretary of defense for Health and Medicine, and with James P. Hollers, dentist member of the Advisory Committee to that office. They discussed proposed legislation on dental care of dependents of military personnel and a proposed Armed Forces scholarship program for dental students.

A bill affecting the VA's outpatient dental care program has been introduced by Congressman Peter Frelinghuysen, Jr. (R., N.J.). The bill would enact in the form of permanent legislation the provisions contained in the rider to last year's VA appropriations bill. It would also establish a legislative basis for the revised regulation relating to dental care. Under Congressman Frelinghuysen's bill outpatient dental care would be limited to those who have a dental disability of greater than 10 per cent except where application for treatment is made within one year after discharge or before July 27, 1954, whichever is later, or where the disability arose as an adjunct to imprisonment as a prisoner of war. Under the bill, repeat dental treatment would be eliminated for those with less than 10 per cent disability.

On March 26 to 28 the Council on Legislation and the Council on Federal Dental Services will hold a joint conference with government officials to evaluate the status of the government's dental program. Chester Keefer, special assistant to Mrs. Hobby, and Dr. Berry have been invited to attend. Also invited have been the chiefs of the dental services, a representative from the Hoover Commission Task Force, and chairmen of Congressional committees concerned with health programs. E. Harold Gale and Dr. Friedrich will serve as joint chairmen.

INSURANCE AVAILABLE TO DENTISTS UP TO AGE 70

Dentists who reach their 70th birthday during the present enrollment campaign for the Association's Group Accident and Health Insurance Plan will still be covered by the Plan provided their application is received at the office of the M. A. Gesner Co., 150 East Superior Street, Chicago, before their birthday.

So-called impaired risks, those dentists with poor medical histories, will receive a maximum coverage of $200 a month, provided half of the eligible A.D.A. membership or half of the dentist's state

society membership files application. Less than 8,000 additional applications are needed to reach the national quota. About ten states have already met the state eligibility requirement.

The Association Plan insures the dentist against disability and inability to practice, as well as against accidental death or dismemberment. Because of the group buying power of the Association, the insurance protection is available at a cost of from 35 to 50 per cent less than that of any comparable insurance secured on an individual basis.

The current enrollment period continues to May 1. All individuals whose applications were returned during the last enrollment campaign are urged to send new applications—but no money—to Dr. Zillmann, 29 Walden Avenue, Buffalo, N. Y.

RELIEF FUND RECEIPTS ONLY $5,000 FROM GOAL

Contributions to the Association's Relief Fund totaled $95,097.87, only $5,000 from the $100,000 goal, as of February 11, reports the Council on Relief. With 95.1 per cent of the total quota paid in, contributions are running ahead of the corresponding period a year ago. A total of 24 societies are over the top.

Contributions by students, dentists in unorganized regions and associate members totaled $700.25. As of February 11, constituent societies contributed as follows:

Quota over $900

	Quota	Contributions to February 15	Pct.
California	$ 3,740.00	$ 4,161.00	111.3
So. California	4,530.00	6,732.50	148.6
Colorado	920.00	879.00	95.5
Connecticut	1,930.00	1,755.12	90.9
Florida	1,270.00	1,353.00	106.5
Georgia	1,040.00	891.50	85.7
Illinois	7,370.00	7,251.25	98.4
Indiana	2,350.00	2,465.00	104.9
Iowa	1,860.00	2,167.30	116.5
Kansas	990.00	880.80	89.0
Kentucky	1,120.00	1,079.76	96.4
Louisiana	1,010.00	1,080.50	107.0
Maryland	1,060.00	991.00	93.5
Massachusetts	3,780.00	3,453.83	91.4
Michigan	4,010.00	4,240.65	105.8
Minnesota	2,940.00	2,737.50	93.1
Missouri	2,530.00	2,333.56	92.2
Nebraska	1,060.00	1,058.85	99.9
New Jersey	4,070.00	4,115.50	101.1
New York	15,210.00	9,523.86	62.6
N. Carolina	1,230.00	1,043.50	84.8
Ohio	4,980.00	4,369.05	87.7
Oregon	1,200.00	1,145.00	95.4
Pennsylvania	6,830.00	5,213.50	76.3
Tennessee	1,200.00	3,175.53	264.6
Texas	3,160.00	2,155.00	68.2
Virginia	1,130.00	1,079.00	95.5
Washington	1,780.00	2,049.50	115.1
Wisconsin	2,910.00	2,135.00	73.4
Total	$87,210.00	$81,516.56	93.5

Quota of $900.00 or less

	Quota	Contributions to February 15	Pct.
Air Force	$ 600.00	$ 431.50	71.9
Alabama	750.00	1,649.11	219.9
Alaska	50.00	177.00	354.0
Arizona	280.00	95.00	33.9
Arkansas	560.00	624.00	111.4
Army	630.00	332.50	52.8
Delaware	160.00	173.00	108.1
Dist. of Col.	850.00	1,374.00	161.6
Hawaii	360.00	414.00	115.0
Idaho	260.00	512.00	196.9
Maine	450.00	300.00	66.7
Mississippi	520.00	423.10	81.4
Montana	370.00	402.15	108.7
Navy	850.00	396.50	47.8
Nevada	90.00	118.50	131.7
N. Hampshire	290.00	261.00	90.0
New Mexico	250.00	271.50	108.6
North Dakota	340.00	492.05	144.7
Oklahoma	890.00	1,205.00	135.4
P. Canal Zone	20.00	.....	....
P. Health Serv.	260.00	133.00	51.2
Puerto Rico	190.00	171.00	90.0
Rhode Island	580.00	385.00	66.4
So. Carolina	410.00	335.00	81.7
So. Dakota	340.00	482.00	141.8
Utah	450.00	354.50	78.8
Vermont	190.00	137.00	72.1
Vet. Admin.	900.00	338.15	37.6
West Virginia	740.00	757.50	102.4
Wyoming	180.00	136.00	75.6
Total	$12,790.00	$12,881.06	100.7

OASI TAX FORM, SCHEDULE C-a, EXPLAINED BY COUNCIL

Included in the forms received by dentists for their income tax returns is Schedule C-a (Form 1040). The purpose of this form is to make a return of self-employment income for Old Age and Survivors' Insurance purposes and to determine the amount of tax due for that purpose.

The Council on Legislation has pointed out that since dentists who are self-employed are not covered under OASI, it is not necessary for them to fill out this form unless they have other self-employment income. In such case, the amount of dental self-employment income should be excluded from the report.

CONFEREES STRESS NEED FOR SCHOOL DENTAL PROGRAMS

Dental health education, to be effective, should be an integral part of the regular school curriculum. Action to initiate a school dental health education program should be taken by the school, the parents, the dental profession or the community—whichever of these groups sees the need for such a program. Responsibility for carrying it out should be shared between the groups.

These were major points made by educators and health workers from 16 national education and health associations at a conference on dental health education held January 25 and 26. The conference was sponsored by the Association's Division of Dental Health Education of the Council on Dental Health.

Perry Sandell, director of the Division, presided at the conference. Discussion leaders included Angus R. Rothwell of the American Association of School Administrators, John Sternig of the Association for Supervision and Curriculum Development, William Jordan of the Association of State and Territorial Dental Directors, Elizabeth Sowell of the National Education Association and Henry Helmholz of the National Congress of Parents and Teachers.

PUBLISH BOOKLET ON HEALTH PROGRAM POLICIES

A booklet entitled *Official Policies of the American Dental Association on Dental Health Programs* has been published by the Council on Dental Health. The booklet contains a compilation of official actions of the Association to January 1954 in regard to dental health objectives and programs, and incorporates within it a former booklet entitled *A Dental Health Program for the Community, State and Nation.*

"In the past decade or more," the brochure states, "there has been increasing recognition by the public of the value of dentistry as an essential health service." The policy statements in the brochure prescribe the essential requirements for planning and maintaining dental health programs. Single copies may be obtained without charge from the Council on Dental Health.

Daniel F. Lynch, Association president-elect, shown shaking hands with Ted Mack at the program of The Original Amateur Hour on January 30. Mr. Mack recognized Dr. Lynch in the audience and used the occasion to make an announcement on National Children's Dental Health Day.

COUNCIL ANNOUNCES SUBJECTS FOR SCIENTIFIC SESSION

Four subjects will be featured on the scientific program at the 95th annual session to be held in Miami, Fla., November 8-11, reports the Council on Scientific Session. These are: (1) the role of sugar as a factor in dental caries, (2) the use of newer devices for cutting tooth structure, (3) uses of elastic impression materials, and (4) the hazards of the roentgen ray in dental practice.

An innovation for this year's scientific session will be clinics in which the clinician will use slides and other visual aids to help him in his demonstrations.

APPROVAL WITHDRAWN FROM BRISTOL-MYERS BOOKLETS

Withdrawal of Association approval of dental health education booklets and posters issued by Bristol-Myers Co. has been announced officially by the Council on Dental Health. The company, which manufactures Ipana tooth paste, was notified that the action had been taken because of therapeutic claims advanced for the dentifrice in advertising. The product has not been accepted by the Association's Council on Dental Therapeutics.

U.S. HAS 93,726 DENTISTS SURVEY SHOWS

There are 93,726 licensed dentists in the United States, approximately one dentist for each 1,700 persons, according to a report prepared by the Association's Bureau of Economic Research and Statistics. Dentistry is the third largest professional group engaged in independent practice, exceeded only by medicine and law.

The Middle East area (including Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania and West Virginia) ranks first in the proportion of dentists to population. New England is second, the Far West third. Fewer dentists in proportion to population than any other section of the country are found in the southeast region (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North and South Carolina, Tennessee and Virginia). Among the states, New York ranks first in dentist-population ratio. South Carolina is last.

URGE DENTISTS TO CONTINUE PROFESSIONAL GROWTH

Participants in the Tenth Congress on Dental Education and Licensure held in Chicago February 6 under the auspices of the Council on Dental Education urged the dentist not to stop learning after his graduation from dental school, but to continue his professional growth through further education.

The question being discussed was "What should be the state board's responsibility to the public for the continued competence of the practitioner?"

Panelists agreed that boards of examiners have as their main responsibility the determination of initial competence and the enforcement of states' dental practice acts, that schools should instill in the student an understanding that continuing education is essential to professional growth, but that major responsibility for continued competence lies with the dentist himself.

Greater use of the examinations of the National Board of Dental Examiners as a step in the direction of some sort of reciprocity between states was urged.

Three recent graduates, David P. Redmond of Glen Ellyn, Ill.; Robert E. Barnes of Aurora, Ill., and Charles A. Janda of Chicago, opened the afternoon session which discussed "What changes do recent graduates suggest for the prac-

tices of the state boards and for the curriculum of the dental schools?"

Suggestions for changes in school curriculums and state licensing examinations included: more emphasis in the school curriculum on oral diagnosis, an integration through the four year program of basic sciences and clinical work, a course in practice management designed to help the future dentist do a better service job for his patients and the finding of a substitute for the placement of a gold foil restoration required by many state boards.

Panel moderators were Henry A. Swanson, past president of the American Association of Dental Examiners, Washington, D. C. and Raymond J. Nagle, dean of the College of Dentistry, New York University.

Panel participants included Lester W. Burket of Philadelphia; Hugh B. Smith of Columbus, Ohio; George W. Teuscher of Chicago; Russell I. Todd of Richmond, Ky.; Archie A. Albert of Pawtucket, R. I.; O. M. Dresen of Milwaukee; Carl A. Frech of Gary, Ind.; Vernon L. Hunt of Eureka, Calif.; Harry B. McCarthy of Dallas, Texas and Reuben E. V. Miller of Easton, Pa.

Over 200 persons attended the Congress. This is the largest attendance to date at such a congress.

FIND NO SUPPORT FOR CLAIMS OF "ANTI-ENZYME" DENTIFRICES

The Council on Dental Therapeutics, in a report issued January 23, stated that new evidence on the so-called "anti-enzyme" tooth pastes does not support original claims made for their effectiveness in preventing dental decay. In a resolution approved unanimously by the Council, the agency said it had reviewed the evidence on "anti-enzyme" dentifrices and had "found no satisfactory evidence of their effectiveness against tooth decay."

The resolution also said that there is doubt that a dentifrice containing sodium N-lauroyl sarcosinate, which is now on the market, would have the "superior ability" it claims in preventing decay-producing acid formation.

The Council in its January 22-23 meeting decided to allocate $1,200 from its budget to the Eastman Dental Dispensary for partial support of the third year of its three-year clinical topical fluoride study.

INDEX TO DENTAL LITERATURE FOR 1953 PUBLISHED

The 1953 annual *Index to Dental Literature* now available from the Order Department at the Central Office is 10 per cent larger than the *Index* of last year. This volume contains the fourth quarter compilation as well as the material compiled in the three preceding quarterly *Indexes*. The Bureau of Library and Indexing Service states that the volume contains material from some 150 publications, including articles in English which appeared in foreign language publications. The *Index* may be purchased at $10 a copy.

DENTAL CARE NEEDS REPORT READY IN PAMPHLET FORM

Prevailing dental needs were generally less in 1952 than in 1940, and 1952 dental patients saw their dentist more frequently than did 1940 patients. These are two of the findings of the *Survey of Needs for Dental Care* made by the Bureau of Economic Research and Statistics of the Association. The survey was published serially in THE JOURNAL during 1952 and 1953, and is now available in pamphlet form from the Bureau.

The survey contains information on the relation of dental needs to the age and sex of patients, to their income and occupation, to region of the country, and

to the length of time since the patient last visited his dentist. It also makes comparisons between the findings of the 1952 survey and those of the survey made in 1940.

Dental Societies

CHICAGO MIDWINTER MEETING DRAWS LARGE ATTENDANCE

More than 13,000 dentists and representatives of allied groups from the United States and other countries attended the 89th Midwinter Meeting of the Chicago Dental Society held February 7-10 at the Conrad Hilton Hotel.

One of the major topics discussed was the use of handpieces for high speed instruments in restorative dentistry. The use of antihistamines in oral surgery was also discussed. It was reported that clinicians in various parts of the country have found a reduction in both the incidence and intensity of pain, a considerable shortening of the healing time and noticeably less necrotic tissue when antihistamines have been used.

Leslie M. FitzGerald, president of the American Dental Association, presented greetings from the Association and urged the fluoridation of Chicago water supplies, a measure for which the Chicago Society went on record four years ago.

A cash award of $500 was presented to Maurice V. Stack of the Harvard School of Dental Medicine for his prize-winning essay.

"RESEARCH IN ACTION" TO BE THEME OF MEETING

"Research in Action" will be featured at the annual postgraduate clinic of the District of Columbia Dental Society scheduled for March 14-17 at the Shoreham Hotel, Washington, D. C. Eight national organizations will present the highlights of some of their current dental research projects. In their presentation the research men will use actual research equipment, laboratory demonstrations and exhibits.

Registered clinics are also featured at the Society's meeting. Among the dentists taking part in the clinics are: Lester W. Burket of Pennsylvania; Lewis Alexander Cohn of New York; Irving R. Hardy of Boston; Lewis Fox of South Norwalk, Conn.; Gaylord J. James of Cleveland; Daniel J. Holland of Boston; Arthur Dick of Washington, D. C.; Lt. Col. B. O. A. Thomas, DC, USNR and Col. Joseph L. Bernier, DC, USA.

"PREVENTION THE ANSWER" CONFERENCE STATES

The answer to dental health lies not so much in repair as in prevention. This was the theme of the Children's Dental Health Conference presented by the California State Dental Association in San Francisco February 1.

About 400 people registered for the conference which was designed to reach the lay public and to interest local groups in dental health. The morning session heard three speakers: W. Philip Phair, secretary of the Council on Dental Health of the American Dental Association, Edward B. Jones, associate professor of health education, University of California, and Paul Popenoe, founder and general director of the American Institute for Family Relations.

During the afternoon the three speakers served as moderators for participants' panels. Participants pointed out that favorable attitudes toward dental health can be developed by the atmosphere in the dentist's office. It was suggested that the dentist's office have a sign reading "Candy—three pieces for 37c. Sweetened beverages one dollar a bottle." This would make graphic the fact that the candy

Newly elected members of the Board of Directors of the Colegio de Cirujanos Dentistas de Puerto Rico are (l. to r.): Ernesto Davila Diaz, Colegio delegate to the A.D.A.; Mario Ramirez, vice-president; Fernardo Ordoñez, vice-president; José M. Gonzáles, president; Lemuel de Jesús, secretary; Benjamin Vargas, treasurer and José L. Goenaga, auditor.

eater pays not only the price of the candy, but, because he eats candy, will pay also for visits to the dentist. The true price of candy and sweetened beverages is their purchase price plus the cost of dental care.

The summary panel was moderated by Charles A. Sweet, Sr., supervisor of dental health education of the Oakland Public Schools.

NEW ORLEANS CONFERENCE TO BE HELD IN APRIL

Among the clinicians who will participate in the conference of the New Orleans Dental Association scheduled for April 24-27 are: Rex Ingraham of Hollywood, Calif.; Louis I. Grossman of Philadelphia; John Adriani of New Orleans; Philip E. Williams of Dallas, Texas; Ernest B. Nuttall of Baltimore, Md., and S. A. Braly of Waco, Texas.

STATE DENTAL LEADER, CLAUDE M. PARKS, DIES

Claude M. Parks, a former president of the North Carolina Dental Society, passed away December 26 at the age of 50 in his home in Winston-Salem, N. C. Dr. Parks for many years was interested in seeing a dental school established in his state. The founding of the dental school of the University of North Carolina was, in large part, the result of his efforts.

Dr. Parks was a member of Psi Omega dental fraternity and was a Fellow of the American College of Dentists.

SOCIETY URGES SCHOOLS NOT TO SELL SWEETS

A resolution recommending that "the sale of candy, soft drinks and other confections in schools be discouraged" has

Senator Lester C. Hunt is greeted in San Juan, P. R. He was made honorary member of the Colegio de Cirujanos Dentistas de Puerto Rico at its convention January 28. Among the guest speakers were Leslie M. FitzGerald, president of the American Dental Association, and Francis J. Garvey, of the Association's Council on Legislation. Seen (l. to r.) are Mrs. José M. Gonzáles, Lieutenant Vidal, assistant to Governor Munoz-Marin, Senator Hunt, José M. Gonzáles, Colegio president, and Mr. Garvey.

been adopted by the Rhode Island State Dental Society, according to Nicholas G. Migliaccio, the society's secretary.

Copies of the resolution have been forwarded to school authorities and to the state's parent-teacher association.

DEATH OF CHESTER A. BAKER REPORTED BY SOCIETY

Chester A. Baker, past president of the District of Columbia Dental Society, died recently after a seven month illness. He was at one time president of the District Board of Dental Examiners. Dr. Baker taught at the Georgetown University School of Dentistry for many years and helped to organize a G.V. Black Study Club in the District.

JOHN OPPIE McCALL TO BE HONORED AT DINNER

A testimonial dinner in honor of John Oppie McCall is being given May 8 at Hotel Shelburne, New York. Dr. McCall has been active in the dental profession for 50 years, during which time he edited several dental journals and authored a number of textbooks.

In addition to his years of practice as a specialist in periodontics, Dr. McCall taught periodontics at the University of Buffalo and at Columbia University. For over a decade he served as director of the Murry and Leonie Guggenheim Dental Clinic and School for Dental Hygienists.

Chairman of the committee on arrangements is Meyer Lerner. Information on the dinner may be obtained from Dr. Lerner, 434 Brooklyn Ave., Brooklyn.

OUTSTANDING DENTAL LEADER, ARTHUR E. CORBY, DIES

Arthur E. Corby, outstanding New York dental leader, died February 16 after a brief illness. Dr. Corby, a trustee of the University of Pennsylvania, was author of many technical and scientific dental articles.

He was immediate past general chairman of the Greater New York Dental Meeting, at which time he arranged the symposium on the relationship between smoking and lung cancer. The findings disclosed at the symposium severely affected the price of tobacco on the stock market and stimulated the formation of the Tobacco Industry Research Committee.

Dr. Corby was president in 1951 of the First District Dental Society. He was a fellow of the American College of Dentists and of the International College of Dentists.

Dental Education

UNIVERSITY NAMES DENTIST HONORARY PROFESSOR

Samuel Charles Miller, professor at the New York University College of Dentistry, has been named Honorary Professor of the University of Santo Domingo, Trujillo City, Dominican Republic.

The honor was accorded Dr. Miller, states the citation, because he has achieved "an outstanding meritorious service" in the field of periodontics and "has distinguished himself in the teaching as well as in the practice of this discipline."

Dr. Miller joined the NYU College of Dentistry faculty in 1925. He is author of a text book on periodontics and has contributed 70 articles on his specialty to professional journals. He also is an hon-

orary member of the Bolivian Dental Association and of the Primer Congreso National de Odontologos of Colombia.

OKLAHOMA REGENTS PROPOSE DENTAL SCHOOL FOR STATE

A resolution favoring the establishment of a dental school in Oklahoma has been adopted by the board of regents of the University of Oklahoma. Rolla C. Calkin, president of the Oklahoma State Dental Association, headed a delegation that conferred with the regents on the need for the school and outlined plans for a four-year institution for 150 students. Establishment of the school is dependent on action by the state legislature.

SCHOOLS OFFER GRADUATE AND POSTGRADUATE PROGRAMS

Columbia • Columbia University School of Dental and Oral Surgery announces a course in clinical physiology of occlusion to be given May 26-28 by L. Laszlo Schwartz and associates. The course will consist of lectures, demonstrations, and the examination and treatment of patients from the temporomandibular joint clinic. Information may be had from the postgraduate division, School of Dental and Oral Surgery, Columbia University, New York. Four postgraduate courses in periodontology are offered at Columbia University School of Dental and Oral Surgery. A full-time program covering a period of two academic years and a half-time program covering a period of four academic years lead to a certificate of training in periodontology. Of the two part-time courses, one course will be given one full day a week from September 22, 1954 to May 4, 1955. The second course will be given one half day each week during the same period. Further information may be obtained from the postgraduate division, School of Dental and Oral Surgery, at Columbia University, New York.

Indiana • A symposium on crown and bridge and a course on hydrocolloid technics are being offered during April by the Indiana University School of Dentistry.

The course on hydrocolloid technics scheduled for April 26-30 is under the direction of John F. Johnston, chairman of the department of crown and bridge. Faculty members on the program include John F. Johnston, Drexell A. Boyd, Frederick A. Hohlt, Ralph W. Phillips and members of the crown and bridge and operative dentistry staff.

Speakers taking part in the April 7 crown and bridge symposium are Robert Dressel of Western Reserve University, J. W. Adams, G. T. Gregory, J. F. Hall, Gerald Hiatt and J. F. Johnston of the Indiana dentistry school.

Further information is available from M. K. Hine, dean of the School of Dentistry, Indiana University, Indianapolis.

North Carolina • Clinical and laboratory facilities of the School of Dentistry, the North Carolina Memorial Hospital and Gravely Sanatorium will be available to graduate students in oral surgery at the University of North Carolina School of Dentistry this fall. Graduate instruction in oral surgery will begin at that time, and will lead toward a Master's degree or a certificate from the Graduate School. The program requires a residency of two academic years and two summer sessions.

Further information may be obtained from the Office of the Dean, School of Dentistry, University of North Carolina, Chapel Hill, N. C.

Northwestern • A postgraduate course in complete denture construction will be given at Northwestern University Dental School May 3-11 under the direction of Robert M. Appleman, professor of prosthetic dentistry and chairman of the department. The course will consist of lectures, demonstrations and clinical ex-

perience. Dr. Appleman will stress the more recent technics in tooth setting and natural tissue color procedures.

Further information may be obtained from the director of graduate study in dentistry, Northwestern University Dental School, 311 East Chicago Avenue, Chicago 11.

Pennsylvania • A course in oral surgery and anesthesia will be offered March 29 to April 3 by the School of Dentistry of the University of Pennsylvania. Thomas M. Meloy and associates will teach the course.

The lectures and clinical demonstrations are planned to present from the clinical point of view all phases of dental surgery including exodontics, as employed in routine surgical and operative practice. The various methods of anesthesia will be demonstrated. Enrollment is limited to 12. Further information is available from the School of Dentistry.

Toronto • The University of Toronto Faculty of Dentistry is offering three continuation courses for graduates in dentistry. A course in orthodontics, designed for the general practitioner, will be offered April 5-9 under the direction of D. H. Jenkins. H. K. Box and C.H.M. Williams will direct a course April 26-30 in periodontics, and a course May 3-7 in dental oral surgery and anesthesia will be directed by J. H. Johnson.

Information on the courses may be obtained from the dean, Faculty of Dentistry, University of Toronto, 230 College Street, Toronto 2-B, Ontario.

FELLOWSHIPS, RESIDENCIES, AVAILABLE AT UNIVERSITIES

Columbia • The School of Dental and Oral Surgery of Columbia University announces that two fellowships are being offered to train dentists in special medico-dental problems in the treatment of children with cerebral palsy. Each fellowship carries a stipend of $3,000 to $3,600.

The fellowship is a two year full-time program. During the second year emphasis will be on complete inpatient and outpatient cerebral palsy dental service.

Applications may be obtained from the postgraduate division of the dental school. The application deadline is May 1.

Marquette • Vacancies exist in residencies in oral surgery and in prosthodontics at the Veterans Administration Hospital at Wood (Milwaukee), Wis. The residencies are to begin July 1. The residency in oral surgery is for three years; that for prosthodontics is for two. Further information may be obtained from the chief of the dental service, Veterans Administration Hospital, Wood, Wis., or from O. M. Dresen, dean, Marquette University School of Dentistry, Milwaukee, Wis.

BERKSHIRE CONFERENCE TO MEET IN JUNE

A special feature of Tufts College Dental School's Berkshire Conference in Periodontology and Oral Pathology scheduled for June 20-24 at Falmouth, Mass., will be a clinicopathological seminar with microscopes provided for all participants. The Conference is sponsored by the Dental School's division of graduate and postgraduate studies.

The program will consist of four days of lectures, seminars and panel discussions on clinical problems in dentistry, medicine and their related fields.

The faculty of the conference includes Irving Glickman, Hamilton B. G. Robinson, Col. Joseph Bernier, Harry H. Shapiro, Robert E. Moyers, Joseph S. Landa, Don Bellinger and David Weisberger.

Further information may be obtained by writing to The Fifth Berkshire Conference, Tufts College Dental School, 136 Harrison Avenue, Boston 11.

Public Health

ARKANSAS BOARD OF HEALTH ELECTS DENTIST CHAIRMAN

Don M. Hamm, secretary of the Arkansas State Dental Association, was recently elected chairman of the Arkansas State Board of Health. Dr. Hamm's election followed his reappointment for another four year term as a member of the state board.

USPHS BEGINS GAINESVILLE DENTAL TREATMENT STUDY

A study designed to provide information on the amount of dental care required by children in a community using fluoridated water began January 11 in Gainesville, Fla. The study is being conducted by the United States Public Health Service, in cooperation with local officials.

Dental care will be provided free of charge to all elementary school children for a period of five years. During that time the USPHS will keep records of the caries experience, the amount and kind of treatment required and the number of dental and auxiliary personnel man-hours spent to give the required care.

Data resulting from the research project will be compared with data derived from preceding studies made in communities which did not fluoridate their water. The results will show whether a difference exists in the number of man-hours required to provide dental care for children where fluoridation is used and where it is not. The study will also show the effect of periodic dental care on the incidence of dental caries and will provide information on the cost to the community of maintaining dental health once the backlog of needs is met.

The Public Health Service is contemplating another study in a community which has natural fluoridation.

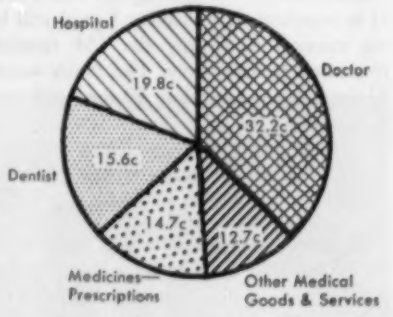
DENTAL CARE 15.6 PER CENT OF NATION'S HEALTH BILL

A total of 1.6 billion dollars was spent for dental care by families in the United States during the year ending July 1, 1953, an amount equal to 15.6 per cent of the total national health bill. These facts were among the findings of a survey conducted by the National Opinion Research Center of the University of Chicago and sponsored by the Health Information Foundation.

In one year, the report stated, health care cost the families of the United States 10.2 billion dollars, a family average of about $205. The survey also reported that 16 per cent of the country's families owed bills for health care.

Of the total health bill less than 15 per cent was covered by insurance. Benefits paid for dental treatment (mostly oral surgery) were less than 50 million dollars.

The figure of 1.6 billion dollars spent for dental care for the year ending July 1953 compares with the 1.4 billion dollar figure estimated by the Association's Bureau of Economic Research and Statistics for the year 1952 and with a figure of one



How the expenditures of American families for health are divided. The dentist received 15.6c of each dollar spent for health care. (Reprinted from the New York Times.)

billion dollars for 1952 estimated by the U. S. Department of Commerce.

Only 17 per cent of persons in families with incomes less than $2,000 received dental treatment, while 56 per cent of persons with incomes of $7,500 or more received care.

FLUORIDATION NOW SERVES NEARLY 20 MILLION

Nearly 20 million persons—one-eighth of the nation's population—now drink fluoridated water, the A.D.A. Council on Dental Health reported last month. Of the people in the United States who are served by public water supplies, 19 per cent drink fluoridated water.

Fluoridation now serves 50 per cent of Indiana's urban population. In Maryland 87 per cent of those served by community water supplies are served by fluoridation.

Communities which have recently reported fluoridation programs include Akron, Ohio, with a population of 285,000, Greenville, S. C., where the water supply serves 150,000 persons and Levittown, N. Y., which has a population of 45,000.

In Puerto Rico a fluoridation program is under way which serves nine communities, and reaches 400,000 persons. The Puerto Rican program is part of a six year plan, which, when completed, will reach nearly one million persons.

National Defense

DEFENSE DEPARTMENT ISSUES CALL FOR DENTISTS

The Defense Department sent a call for dentists to Selective Service February 4, after failure of efforts to avoid a draft requisition by recruitment of younger dentists subject to the regular draft law. It is expected that Priority I pool will be big enough to supply the 154 dentists requested by the Navy. The Navy wants 77 for March induction, 40 for April and 37 in May.

NAVY ISSUES BROCHURE ON DENTAL CORPS CAREER

The Bureau of Medicine and Surgery of the U.S. Navy has recently published a brochure entitled *A Career Plan for You in the U.S. Naval Dental Corps.* The pamphlet contains information by which civilian dentists can evaluate the advantages of entering the Dental Corps of the Navy or the Naval Reserve. Copies may be obtained from Navy District Printing and Publications Offices.

ALFRED E. TOYE HEADS PERIODONTICS AT WALTER REED

Col. Alfred E. Toye, DC, USA, has been named chief of the periodontics section in the dental clinic of Walter Reed Army Hospital. He was graduated from Balti-

Col. A. E. Toye

more College of Dental Surgery, University of Maryland, and was engaged in civilian dental practice for 15 years after graduation.

During World War II Colonel Toye served in New Guinea and in the Philippine Islands. Before coming to Walter Reed he served as chief of the dental service at Tokyo Army Hospital.

Oren A. Oliver (right) of Nashville, Tenn., is shown on one of his periodic visits to the dental clinic at Bolling Air Force Base, Washington, D. C., as consultant in orthodontics to the United States Air Force. With Dr. Oliver are (l. to r.) Maj. F. P. Bowyer, chief of the orthodontic department of the 1100th Dental Squadron, a WAF dental patient (in chair) and Col. Jack M. Messner, commander of the 1100th Dental Squadron. Dr. Oliver and 153 other civilian consultants to the Armed Forces counsel on diagnosis and treatment planning, see patients and confer with dental officers during their visits to military installations.

COMMANDER SHORTRIDGE DIES DENTAL CORPS REPORTS

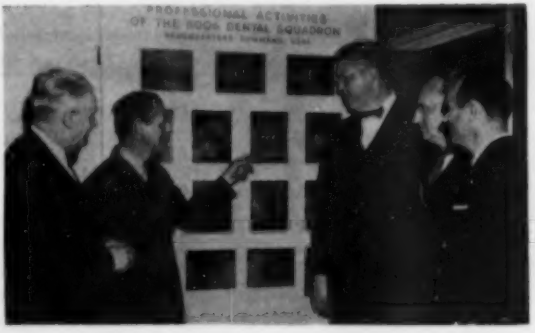
Cmdr. Maurice Sanford Shortridge, DC, USN, retired inactive, died January 8 at the age of 48. Commander Shortridge was graduated from the University of California School of Dentistry.

He served more than 13 years in the Navy, and participated in eight major engagements in the Pacific during World War II. At the time of his retirement for physical disability in 1950, he was serving in the San Francisco area.

RED CROSS OFFERS PROGRAM DESIGNED FOR DENTISTS

The Sub-Committee on Civil Defense reports that arrangements may still be made with the American National Red Cross for entire local dental societies to enroll in Red Cross first-aid training courses designed specially for them. Only dentists will be included.

Instruction will be given on a professional level and will not include the elementary material required for those who



The 1100th Dental Squadron at Bolling Air Force Base serves Air Force personnel in the Washington, D. C. area. Shown inspecting its facilities are (l. to r.): Sen. Lester C. Hunt, member of the Senate Armed Services Committee; Col. Jack M. Messner, commander of the 1100th Dental Squadron; R. H. Friedrich, chairman of the Council on Federal Dental Services of the A.D.A., Daniel F. Lynch, president-elect of the A.D.A. and Henry F. Canby, dental officer of the U. S. Public Health Service.

have little or no knowledge of the anatomy and physiology of the human body. It will require two evenings per week for one month, or one evening a week for two months. At the completion of the course those who qualify will receive a card showing that they are qualified first-aid workers.

Dental societies wishing to enroll may apply to the local Red Cross headquarters. Should there be difficulty in making arrangements with the local Red Cross headquarters for the desired courses, the society may get in touch with Russell W. Bunting, dental consultant, Federal Civil Defense Administration, 2224 Vinewood Blvd., Ann Arbor, Mich.

Research

1955 BUDGET PROVIDES GREATER FUNDS FOR RESEARCH

The proposed government budget for the fiscal year of 1955 provides for an increase in the appropriation for dental research over the amount authorized for the current year. The recommended appropriation is $620,000, an increase of $47,000. At the same time, the budget provides for a small cut in over-all dental health activities of the U.S. Public Health Service.

The 1.7 million dollars recommended for dental health activities of the USPHS compares with the 19.7 million dollars appropriated for cancer research, with 14.6 million dollars for heart research, 5.9 million dollars for microbiology, 7.3 million dollars for arthritis and metabolic diseases and 4.8 million dollars for neurology and blindness.

Dental health received 0.9 per cent of the total amount provided for research grants to be made by the seven National Institutes of Health. It received 2.9 per cent of the amount for research fellowships and 2.9 per cent of the amount allotted for government research. The institute receiving the next smallest amount received three times as much as did the Institute for Dental Health.

The budget also proposes a cut of nearly 75 per cent for the Veterans Administration outpatient dental program. This cut is based on the recommendation

Proposed budget for National Institutes of Health 1954-55

	Research grants		Research fellowships		Government research	
Institute	1955 actual	Pct. of total	1955 actual	Pct. of total	1955 actual	Pct. of total
Cancer	$ 6,700,000	28.3	$ 625,000	36.1	$ 5,514,000	26.6
Heart	6,400,000	27.0	450,000	26.0	3,276,000	15.8
Mental Health	2,587,000	10.9	187,000	10.8	2,820,000	13.6
Microbiology	1,950,000	8.2	117,000	6.8	3,664,000	17.7
Arthritis & Metabolic Diseases	3,152,000	13.3	150,000	8.7	3,512,000	16.9
Neurology & Blindness	2,700,000	11.4	150,000	8.7	1,283,000	6.2
Dental Health	221,000	0.9	50,000	2.9	620,000	2.9
Total	$23,710,000		$1,729,000		$20,689,000	

that the Congress extend for 1955 the provision limiting dental treatment for noncompensable disabilities to those cases for which application for treatment is made within one year of discharge. Another limiting provision of the program is the requirement calling for actual proof of service-connection in dental defects.

MEDICAL RESEARCH SOCIETY CITES THREE AT MEETING

A former research foundation official and two physicians were voted citations of honor February 7 by the board of directors of the National Society for Medical Research at that organization's annual meeting in Chicago.

They were Anton Rost, former president of the National Canine Research Foundation; Walter Alvarez, Chicago physician and medical columnist; and A. C. Ivy, of the University of Illinois College of Medicine.

Mr. Rost received his award for his many suggestions on the better care of laboratory animals. The citations for Dr. Ivy and Dr. Alvarez were for promoting public understanding of the value of animal experimentation for the advancement of medicine and the importance of research to the furtherance of health.

The American Dental Association is a contributing member of the NSMR.

NBS DENTAL RESEARCH MAN, WILMER SOUDER, RETIRES

Wilmer Souder, consultant to the National Bureau of Standards, and known as the "father of the renaissance" of the science of dental materials, retired at the end of February.

Dr. Souder developed the Bureau's dental research laboratory. He contributed extensively to the science of dental materials, and was awarded a medal and citation for his contributions by the U.S. Department of Commerce in 1951. He has lectured both in the United States and abroad. Many of his research papers have been translated into other languages.

W. Souder

Dr. Souder is an active member of the International Association for Dental Research and holds an honorary membership in the American Dental Association.

International

FRENCH DENTAL JOURNALS MERGE TO SINGLE REVIEW

Two of the oldest dental journals of France ceased publication at the end of 1953, merging with two younger journals to produce a single review. The journals involved were *L'Odontologie*, founded in 1881 and representing the Association générale de Dentistes de France and *La Revue 'Odontologique*, founded in 1879. They merged with *Bulletin de l'Association des Dentistes Indépendants* and *Revue Dentaire Française*. The new journal is entitled *Revue Française d'Odonto-Stomatologie*.

DENTAL DISEASE PREVENTION TO BE THEME OF F.D.I. MEETING

Prevention of dental disease will be the theme of the Fédération Dentaire Internationale meeting to be held at the Scheveningen, The Hague, June 8-13.

The six day meeting will hear papers on prevention of caries, periodontal disease and malocclusion. Provision has been made for simultaneous translations in English, French and German.

The F.D.I. meeting is being held in conjunction with a Jubilee Congress, sponsored by the Dutch dental profession. Association members are invited to attend. Oren Oliver of Nashville is president of the F.D.I. and will head the American delegation.

Requests for hotel accommodations should be forwarded by March 15 to G. Arnold, at the Jubilee Congress office, 1 Adriaan Goekooplaan, The Hague, Netherlands.

CANADIAN BOARD FINDINGS ACCEPTED BY ALL PROVINCES

The Canadian Dental Association reports that a national dental examining board has been established and that its examinations and certificates will be accepted by all Dominion provinces for licensing purposes in lieu of Dominion written examination.

For the past 50 years the Dental Council of Canada has been giving examinations. These were accepted by most, but not all, of the provinces. The new board will take the place of the Dental Council.

ARGENTINE ASSOCIATION NAMES NEW OFFICERS

The following have been elected officers of the Asociación Odontológica Argentina for the year 1954. The members of the board of directors are: Esteban L. Biolcati, president; Antonio Calle Guevarn, vice-president; Enrique E. Müller, secretary; Marcelo Friedenthal, assistant secretary; Carlos M. Arce, treasurer; and Samuel Pisarenko, assistant treasurer. Elected to the Tribunal of Honor were Armando E. Monti, president, and Horacio C. Mazariegos, secretary.

General

MINNESOTA BLUE SHIELD COVERS LIMITED DENTAL CARE

Certain dental treatments, principally those involving oral surgery, are covered in a revised program of benefits available under the Blue Shield insurance plan in Minnesota. The new program, authorized by the state legislature, became effective January 1. Blue Shield will pay from $15 to $75 toward the cost of the covered services.

ORAL SURGEONS TO HOLD MEMBERSHIP EXAMINATIONS

The American Society of Oral Surgeons will hold examinations for candidates for membership at the Hollywood Beach Hotel, Hollywood, Fla., October 30 through November 3. The examinations will precede the Society's 36th annual meeting scheduled for November 3-6. Applications for membership forms may be secured from Ruth F. Whalen, executive secretary, Post Office Box 876, Richmond 19, Va.

DENTISTS TO PARTICIPATE IN ORAL CANCER CONFERENCE

Two dentists are included among the members of the health professions who are scheduled to take part in an all-day conference on oral cancer sponsored jointly by the Brooklyn Veterans Admin-

istration Hospital and the Second District Dental Society May 7.

Lester R. Cahn of Columbia University will discuss differential diagnosis of oral cancer. Henry C. Sandler of Brooklyn VA Hospital speaks on the role of the dentist in cancer control. Dr. Sandler will also participate as a member of the head and neck surgical team in a presentation of treated cases scheduled for the afternoon session.

RADIO, PRESS, BUSINESS FIRMS HELP ON DENTAL HEALTH DAY

Excellent cooperation with the dental profession in the observance of Children's Dental Health Day on the part of the radio, the press, television stations and numerous commercial firms has been reported to the Association.

One of the organizations which cooperated with the program was the Metropolitan Life Insurance Company. During the first week of February, dental health messages sponsored by the company were carried daily on 81 radio stations in the United States and Canada. Metropolitan also featured pedodontics in advertisements which appeared in 14 national magazines.

OFFICERS ELECTED BY IMPLANT DENTURE ACADEMY

The following men were elected officers of the American Academy of Implant Dentures at its meeting February 7: Aaron Gershkoff of Providence, R. I., president; Wayne Paullus of Miami, Fla., president-elect; Capt. Philip S. Loechler, DC, USA, vice-president; Edward J. Kresse of Denver, secretary and Isaiah Lew of New York, treasurer. Elected to the executive council were: Alvin Filastre of Lakeland, Fla.; John Knowlton of Seattle and Rex Witherspoon of Springfield, Mo.

XI PSI PHI FRATERNITY ELECTS OFFICERS

Officers and board members of the Xi Psi Phi professional dental fraternity were elected at the Fraternity's biennial Supreme Chapter Assembly Meeting in Lincoln, Neb., December 27-29, 1953.

The officers are: George L. Delagnes of San Francisco, supreme president; Floyd L. Paynter of Omaha, supreme president-elect; William E. Koch, Jr. of St. Louis, supreme secretary-treasurer; and William L. Barnum of Portland, Oregon, supreme editor. Elected board members were: George Selleck of San Francisco, Frederic T. Emery of Seattle, Edward O. Graff of Cleveland, E. Jeff Justis of Memphis, Tenn. and G. A. C. Jennings of Richmond, Va.

CARE OF LONG-TERM PATIENTS TO BE SUBJECT OF CONFERENCE

A national conference on care of the long-term patient, under the auspices of the Commission on Chronic Illness, will be held in Chicago at the Edgewater Beach Hotel March 18-20. The American Dental Association's Council on Dental Health has prepared a statement for use by the Commission entitled "The Role of Dentistry in Chronic Illness." David W. Brock will represent the Association at the meeting.

MAGAZINE FOR TEACHERS CITES DENTAL HEALTH DAY

The Instructor, a magazine which circulates widely among school teachers, helped to publicize National Children's Dental Health Day in its February issue. It carried both an announcement on Dental Health Day in its "Special Events" column, and a full-page picture of a smiling youngster in the dentist's chair entitled "The Dentist Is Our Friend."

CORRECTION OF ARTICLE FROM FEBRUARY ISSUE

An error in the article *Temperatures Developed in Rotating Dental Cutting Instruments* which appeared in the February 1954 issue has been brought to the attention of THE JOURNAL. Conclusion no. 2, page 133, should read "Under the conditions used in this investigation, steel and carbide burs under constant load cut more rapidly as their speed of rotation increases."

ACADEMY OF PERIODONTOLOGY ELECTS OFFICERS

The following men have been elected 1954 officers of the California Academy of Periodontology: Samuel Bleadon of San Francisco, president; R. Thomas Dunkin of San Jose, vice-president; Howard J. Mallon of San Francisco, recording secretary; Elmer G. Smith of Alameda, financial secretary and Clarence E. Butler of San Francisco, treasurer.

ALUMNI MEETING TO DISCUSS PRACTICE ADMINISTRATION

A symposium on practice administration will be featured at the annual meeting of the alumni society of Temple University School of Dentistry May 12. Participating in the symposium are Cecil H. Bliss of Sioux City, Iowa; S. Joseph Bregstein of Brooklyn and Jay H. Eshelman of Philadelphia.

MEDICAL PROFESSION PRAISES BOOK BY DENTIST

"The Metabolism of the Tubercle Bacillus" is the title of a book by William F. Drea and Anatole Andrewjew, which has recently been published in Springfield, Ill., by Charles C Thomas.

Dr. Drea, who is a dentist and an authority on the tubercle bacillus, has received recognition for the new book by the medical profession. The American Medical Association gave the book a favorable review in the November issue of the *Journal of the American Medical Association.*

INTERNATIONAL ACADEMY OF ANESTHESIOLOGY TO MEET

The next meeting of the International Academy of Anesthesiology will take place March 17 at the Lloyd Dental Hospital, Chester, Pa.

An essay on ethyl chloride inhalation anesthesia will be presented by J. M. Scioscia, director of the Hospital.

Also participating in the program are Jay Mervis, superintendent and anesthetist of Gormer Dental Hospital, McKeesport, Pa.; Myer Solomon, Williamsport Hospital, Williamsport, Pa.; and Seymour Alpert, associate professor of anesthesiology, George Washington University School of Medicine.

The meeting will be open to members and guests.

Further information can be obtained from the Academy, at 355 East 149 Street, New York 55.

AMERICAN DENTURE SOCIETY ANNOUNCES ESSAY CONTEST

Annual prizes of $500 and $250 will be awarded to the two senior dental students who submit the best essays on prosthetic dentistry to *The Journal of Prosthetic Dentistry,* it has been announced by the American Denture Society.

July 15, 1954 has been set as the deadline for submitting contest papers.

Information on the contest may be obtained from Arthur L. Roberts, secretary, American Denture Society, Aurora National Bank Building, Aurora, Ill.

THE DENTIST'S CHILD PATIENT TO BE DISCUSSED

"Psychological Relationship Between the Dentist and the Child Patient" will be discussed by Richard Wallen at the annual meeting of the Michigan Society of Dentistry for Children scheduled for March 3 at Ann Arbor, Mich. Dr. Wallen is associate professor of psychology at Western Reserve University.

DENTAL INFORMATION BUREAU CHOOSES NEW CHAIRMAN

Leo E. Sherman was elected chairman of the Dental Information Bureau at its annual meeting in New York January 28. The Dental Information Bureau is the official public relations agency for the dental societies of New York and New Jersey. Theodore Shemella was elected its secretary-treasurer.

Also . . . The British Dental Association's 1954 annual congress will be held the week beginning May 10 in Blackpool, England. Secretary of the Association is H. Parker Buchanan, 13 Hill Street, Berkeley Square, London. . . . Four scholarships of $150 each for summer school courses in medical library work are being offered by the Medical Library Association. The Association's announcement urges that application be made early, as candidates must be approved by the schools giving the courses before the scholarship deadline date of May 1. . . . March 8 and 9 are the dates of the annual meeting of the Northeastern Society of Orthodontists in New York. . . . Inquiries about the Cincinnati Dental Society's Clinic Meeting may be addressed to P. H. McMullen, executive secretary, 123 East 6th Street, Cincinnati. The meeting is set for March 21-23. . . . *Michigan's Health*, a publication of the Michigan Department of Health, Vol. 1, No. 47, states, "Dental examination of Grand Rapids' youngsters after eight years of drinking fluoridated water shows a 71 per cent reduction in the number of decayed permanent teeth in the six-year-olds and a 25 per cent reduction in decayed permanent teeth of sixteen-year-olds." Meetings which have been announced recently include: Southern Academy of Oral Surgery, March 12-14, at Savannah, Ga.; Southern Academy of Periodontology, March 28-30 in New Orleans; Southeastern Academy of Prosthodontics, March 20 and 21 in Atlanta, Ga.; Academy of Denture Prosthetics, April 11 in Miami Beach, Fla. . . . The Italian Society of Dentistry and Stomatology has issued an invitation to American dentists to attend its 29th Congress in Venice, Italy, September 13-18. Inquiries may be addressed to U. Saraval, Campo Manin 4017, Venice, Italy. . . . Chester Lloyd, director of the postgraduate program in pedodontics at the University of Tennessee College of Dentistry has been chosen president-elect of the Memphis Section of the American Society of Dentistry for Children. . . . A report on fluoridation of water has been compiled by the Hong Kong Dental Society. It favors fluoridation of the Hong Kong water supplies. . . . Walter E. Moyer, of Denver, recently presented the dental school at Fuad I University in Cairo with its first colored motion picture on dentistry. Dr. Moyer was introduced at the school by LeRoy M. Ennis, of Philadelphia, A.D.A. past president, now in Egypt to assist the government in modernizing dental education and practice in the country.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

ASKS FLUORIDATION FOE TO PRESENT EVIDENCE

It was hoped that our letter to you and the enclosed reply of the Sheboygan County Dental Society to Dr. Brehmer's letter which appeared in the November JOURNAL had reached you in time to be included in the February issue. Apparently, this was not the case.

There still has been no answer from Dr. Brehmer to the letter and none is expected. His charges cannot be verified.

A. H. Finke

Dear Dr. Brehmer:

Your letter which appeared in the November issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION has been brought to the attention of the membership of the Sheboygan County Dental Society. This letter, which is a severe condemnation of the program of fluoridation of the public water supply of the city of Sheboygan, has evoked considerable interest from the members of the society.

At a recent meeting on November 14 the members who were present were given an opportunity to offer any evidence that might support the following assertions which appeared in your letter:

1. That fluoridation of the public water supply in the city of Sheboygan is directly responsible for dental fluorosis (mottled enamel).

2. That such fluoridation has had no beneficial effect in reducing dental caries.

Not a single member present offered any information or evidence in support of these assertions. In fact, total disagreement with your letter was expressed.

Since your claims were in complete contradiction to the experience of the majority of society members, a motion was made and seconded that you be given an opportunity to justify your position by presenting clinical evidence in support of your claim that the fluoridation program in Sheboygan is responsible for dental fluorosis. It is also understood that you be given an opportunity to present data (which conforms to accepted clinical research methods) in support of your claim that the fluoridation program has had no beneficial effect in reducing dental caries. The motion was passed unanimously. The membership of the society or a committee representing the society is willing to meet with you at any time at any suitable meeting place you would find convenient to choose.

Since this matter is of serious import to us, we are sincerely interested in obtaining and examining the complete information and evidence which has formed the basis of your opinions. We hope that this proposed conference might clarify our respective positions in an honest and friendly manner. We would greatly appreciate your prompt reply. Sincerely yours,

Robert J. Hildebrand, secretary

HYPNOSIS IN DENTISTRY

As a member of the American Hypnodontic Society, I take exception to the views expressed by Charles Frederick Harper in the October 1953 issue of THE JOURNAL in his review of *Clinical Applications of Suggestion and Hypnosis* by William T. Heron. I question whether Dr. Harper is correctly informed on the present application of hypnosis to dentistry.

I am one of 2,600 dentists in the United States who are employing hypnodontics; from my experience with many cases I believe hypnodontics is a most welcome aid in the development of better interpersonal relationships.

To say (as Dr. Harper did) that nothing more is known about hypnosis today than a thousand years ago is to ignore completely the

vast amount of research and writing by qualified psychologists, psychiatrists, physicians and dentists. The 1953 *Annual Review of Hypnosis Literature*, a publication of the Society for Clinical and Experimental Hypnosis, covers the scientific findings of 79 contributors in the field of hypnosis in the medical specialties, including dentistry.

The use of hypnosis by 2,600 dentists in this country, with a conservative estimate of 75,000 inductions, stands as irrefutable evidence that, contrary to Dr. Harper's opinion, hypnosis has been adapted to dentistry.

In the periodontics department of New York University College of Dentistry, a demonstration is given annually to postgraduate students by the American Hypnodontic Society. Marquette University gives an orientation course of six lectures in hypnodontics to the senior class of dental students. Aaron Moss, a New Jersey dentist, has presented his film, *Operative Hypnodontics*, at the Association meeting in Cleveland and at the recent Greater New York Dental Meeting.

As more dentists apply themselves seriously to the study of hypnodontics under proper direction, they and their patients may well enjoy its benefits.

David Becker, D.D.S.

NO SOCIAL SECURITY

I have just finished making out my income tax, and have again been pleased that I am not required to pay the Social Security tax of $81 that is required of others not as fortunate as dentists.

I noted that this proposed payment would have to be made in "clear" money. This is money that is left after the payment of overhead and taxes. The proposed increase in the tax would mean a dentist would have to pay about $116. This means that I would have to collect about $335 at the dental chair to make this payment.

Now when a dentist or any individual works that hard for clear money he is entitled to keep it. He must not be forced to put it in some half baked scheme that promises to pay it back in dribs and drabs in future money of questionable value.

Last year I took the $81 that I did not have to pay into OASI, bought a new set of golf woods and had enough left over for a good meal. I had a great deal of enjoyment out of both and feel I am healthier than I was last year.

This year I am going to add a little more to it and buy a new set of irons. If I get half the pleasure and benefit out of this new investment that I got out of the old it cannot fail to be worth while.

I personally want no part of pensions, annuities or fixed interest payments, and I do not want too much life insurance either. Most people who invest heavily in these plans get gypped. In the first place most of us are dead at 65, and if we are around, inflation has taken away most of the value of our investment.

If there is any answer to the financial question of old age I'll take my own chances on solving it for myself.

Let's keep things the way they are. NO social security for dentists.

J. Cameron McDade, Philadelphia

DENTISTRY AND SPEECH

Within two weeks of the publication of the January JOURNAL we had over 40 requests for reprints of our article "The Relationship of Dentistry to Speech."

This fact plus the interest shown in our speech exhibits and talks at meetings and conventions indicates that there is a growing interest in speech factors on the part of dentists.

Since the condition of the oral cavity is one of the chief factors in speaking and since many dental procedures affect, either constructively or adversely, the production of normal, intelligible speech, the role played by the dentist in correcting defects and in maintaining normal speech should be quite obvious. However, as in many things in this life, the obvious is sometimes overlooked.

The Cleveland Hearing and Speech Center of Western Reserve University is continually working on research problems in this field and welcomes all comments and questions.

Howard E. Kessler, D.D.S., Cleveland

Book Reviews

PHYSICIANS AND DENTISTS CREDIT AND COLLECTION MANUAL

By the National Retail Credit Association. 54 pages with credit chart and personal letters. Price $2. St. Louis, National Retail Credit Association, 1953.

This manual depicts and resolves in a skillful manner problems which arise in the field of medical and dental credit. The reader is shown how to know his patient's position, his problems, his obligations and his attitudes.

The first chapter considers knowledge of retail credit. In a very lucid manner, it calls for a more enlightened public attitude toward the importance of prompt payment of professional bills and indicates that professional credit granting should follow correct procedures.

Chapter two concerns itself with obtaining and interpreting credit information; it indicates the vast importance of the office assistant's role in creating amicable patient relationships. This chapter also contains credit objectives which are extremely well written—except, as it inevitably occurs in some commercial situations, that the word "sell" is included. In this reviewer's opinion, the word should be deleted.

Patients should be made to understand that dentists are not salesmen and are not selling restorations or anything else. Commercialized teaching of practice management is responsible for impressing some dentists with the importance of "selling" the patient, rather than educating the patient, which is more conducive to good.

One of the most important chapters is entitled "Setting Up the Account and Billing." This calls for accurate accounting records but not necessarily an elaborate bookkeeping system at the exorbitant costs which dentists occasionally encounter these days.

"Collection Procedures" is a chapter well worth the price of the book, especially for the "accounts receivable age analysis," which provides valuable information to the dentist. This chapter also contains seven personalized letters (not to be confused with form letters), valuable because they can be varied to meet individual cases.

The seventh and final chapter, entitled, "You and Your Job," emphasizes the need for closer cooperation among all credit granters in the community and indicates that the growing recognition of medical and dental bills as part of an individual's total credit rating is proving of mutual advantage in many communities. Dentists can play a significant role in still furthering this desirable objective.

This manual, unqualifiedly recommended to the busy physician and dentist, contains so much valuable information that it unquestionably will aid in solving credit and collection problems.

Lloyd H. Dodd

TUMORS OF THE THYROID GLAND

By Shields Warren, M.D., and William Meissner, M.D. 97 pages with 82 illustrations. Price $1.75. Washington, D. C., Armed Forces Institute of Pathology, 1953.

TUMORS OF THE LOWER RESPIRATORY TRACT

By Averill A. Liebow, M.D. 189 pages with 249 illustrations and 3 color plates. Price $1.25. Washington, D. C., Armed Forces Institute of Pathology, 1952.

TUMORS OF THE MALE SEX ORGANS

By Frank J. Dixon, M.D., and Robert A. Moore, M.D. 177 pages with 135 illustrations. Price $1.50. Washington, D. C., Armed Forces Institute of Pathology, 1952.

These are fascicles 14, 17, 31b and 32, respectively, of the *Atlas of Tumor Pathology* published under the auspices of the National Research Council, sponsored and supported by the American Cancer Society, the Anna Fuller Fund, the Armed Forces Institute of Pathology, the Jane Coffin Childs Memorial Fund for Medical Research, the National Cancer Institute of the Public Health Service and the United States Veterans Administration.

As the publication is essentially an atlas, the text is largely—but far from wholly—limited to descriptive material to go with the illustrations. These illustrations are superb and are reproduced on fine quality heavy paper with great fidelity. Although there is no index, each monograph is preceded by a very complete table of contents. A very adequate list of references follows each section of text. Although each fascicle bears the name of only

one or two authors, a veritable host of able workers have made valuable and indispensable contributions. This atlas is a tool of incomparable value in the hands of physicians and pathologists dealing with tumors; but because of the recent very considerable progress in chest surgery and diagnosis combined with noteworthy increase in the incidence of primary lung tumors, the interest in fascicle 17 will be unusually great.

Edward H. Hatton

HISTORY OF ANESTHESIA

By Virginia S. Thatcher. 289 pages with 22 illustrations. Index. Price $5. Philadelphia, J. B. Lippincott Co., 1953.

This book is dedicated to the women who made anesthesia an art that it might become a science. In her preface the author states, "The purpose of this work is to extend the knowledge of anesthetists about themselves beyond the framework of personal references and of already published histories. . . . If the place of the nurse as an anesthetist receives special emphasis in this history, it is because in the others she has been derogated or ignored." Primarily, then, the purpose of this book is to stress the importance of the registered nurse as an anesthetist.

The text is divided into three sections: "Toward a New Art," "Toward a New Science" and "Organized Nurse Anesthesia."

It is difficult to evaluate this volume, as the method of presenting material is quite different from that commonly found in other texts. The author, a registered nurse, appears adequately qualified by training and experience to interpret historical events in the history of anesthesia. The factual contents for the study were obtained from many sources.

While statistics are an important part of the work, they are not burdensome and do not detract from this book. The list of references will be helpful to those who wish to pursue the subject in more detail.

E. Alan Lieban

ROENTGEN, RADIUM AND RADIOISOTOPE THERAPY

By A. J. Delario, M.D. 371 pages with 65 illustrations and 155 tables. Index. Price $7.50. Philadelphia, Lea and Febiger, 1953.

This book presents practical material in a brief form on the use of radioactive isotopes in the diagnosis and treatment of diseases. Radiosensitive tumors and the biological changes produced by radiation are fully discussed. Since it is written by a physician and therapeutic radiologist, it is more readily understood by the clinician than are books for this purpose written by physicists. Not only is the material presented in a form directly applicable to the treatment of disease, but even the sections on the physical and mathematical fundamentals of radioactivity are given in the language of the clinician. This makes for a ready understanding on the part of the clinician who attempts to familiarize himself with this new field.

The section on "The Biological Use of Radioactive Isotopes" is short, and only brief mention is made of the results of tracer studies in disease. No attempt is made to survey the technical methods of using radioisotopes in investigation. There is, however, a detailed presentation of the estimation of dose and the measurement of radioactivity for all clinical and experimental purposes.

William Ward Wainwright

HEALTH PRINCIPLES AND PRACTICE

By C. V. Langton, M.S., Dr.P.H., Ed.D. and C. L. Anderson, M.S., Dr.P.H. 405 pages with illustrations. Index. Price $4.25. St. Louis, C. V. Mosby and Co., 1953.

The editors have placed primary emphasis on the basic principles of health promotion in this textbook because they feel that personal and community health have an organic relationship and that the life and health of an individual affects the life of the community.

In the words of the authors, "Physiology or any other aspect of classical biology is introduced only secondarily as a supplement to the how and why of a principle or to extend the understanding of the reader. Functional health knowledge is the goal of the discussion." The book is directed to the needs of the college student and the health instructor who seeks a textbook dealing with health principles and practices.

These principles and practices are developed in 13 chapters, which include Changing Concepts and Approaches in the Field of Health; Heredity and Eugenics in Health Promotion; Mental Health for the Normal Citizen; Nutrition in Health Promotion; Exercise, Fatigue and Rest; Safety in Health Promotion; Health Aspects of Air and Sunlight; Special Problems of Personal Care; Sex and Reproduction; Poisons of Everyday Life; Communicable Disease Control; State and Local Health Service; International and National Health Services.

Each of these chapters is supplemented by questions and exercises. There are also lists of selected readings at the end of each chapter.

Under the heading of "Special Problems of Personal Care," the subject of oral health receives attention. There are many phrases with which this reviewer cannot agree, such as, "Dental examinations should . . . include the use of x-ray when doubtful conditions exist," or, "Fluorine treatment of children's teeth reduces decay. Treatment after the age of nine is of doubtful value but covering the teeth at intervals with a two per cent solution of sodium fluoride is usually of value." There is no differentiation between fluoridation of the community water supply and topical application of sodium fluoride by the dentist.

A more lucid and factual treatment of the entire subject of oral health would be beneficial.

Harry Strusser

A METHOD OF ANATOMY, DESCRIPTIVE AND DEDUCTIVE

By J. C. Boileau Grant, M.C., M.B., Ch.B., F.R.C.S. (Edin.). Fifth edition. 870 pages with 862 illustrations. Index. Price $7. Baltimore, Williams and Wilkins Co., 1952.

Since the first edition of this book was published in 1937, it has gained more and more influence in the teaching of anatomy. The basic idea that teaching and studying anatomy should be a process of reasoning and understanding, instead of thoughtless memorizing, is kept alive throughout this book.

The arrangement of the material is, therefore, regional; the emphasis is on anatomic relations and on functional analysis. There are some weaknesses inherent in such a venture, the most important being an unequal treatment of the different parts, and sometimes the wide separation of the functionally coordinated structures.

It is inevitable that even a book as good as Grant's text contains some erroneous statements. Some examples may be quoted: Despite Brash's madder experiments, sutural growth of the cranium is an indisputable fact. The growth of the femur is not due to the extensive remodeling, as figure 14 would indicate, but is mainly due to the growth of the distal epiphysis.

Also, it seems an inappropriate choice of words to state that the synovial joints of the limbs, permitting free movements, make for "insecurity." The term "anastomoses" for the connections of nerves leads to many wrong inferences, and should not be applied. Figure 166 gives an incorrect picture of the function of the interossei and lumbrical muscles, which flex the metacarpophalangeal joint while extending the interphalangeal joints.

The action of the mandibular muscles (see also Table 23) is incorrectly described in many points. The medial (internal) pterygoid does not protrude the mandible, but merely fixes it in protrusive position. The posterior part of the temporal does not shift the chin to the same side, but fixes the "resting" condyle, while the other moves forward, downward and inward; finally the deep masseter, digastric and geniohyoid muscles are omitted as retractors of the mandible.

The specific mention of mistakes in the review of a book sometimes creates the wrong impression: that the reviewer is eager to find and to criticize such errors. Nothing would be more unfair, provided that the book under review is a worthwhile contribution to the field of science and teaching. It can be said without equivocation that Grant's text belongs in this category.

Harry Sicher

RECORDS AND REPORTS OF LOCAL HEALTH DEPARTMENTS

By Olive G. Johnson. 89 pages. Index. Price 45 cents. Washington, D. C., U. S. Government Printing Office, 1953.

The importance of accurate and adequate records and reports in the operation of local health departments and the evaluation of services is increasingly recognized. For this reason the U. S. Public Health Service sponsored a series of surveys of report systems in 25 locations in 8 states. This monograph presents the results of these studies. In addition, the report outlines suggested procedures for improved methods for collecting and analyzing data regarding health services.

In the appendix the monograph presents examples of record systems intended to help health departments to prepare and utilize their records and reports more effectively.

F. C. Cady

Current Literature

THE EFFECT OF ORTHODONTIC CEMENT ON TOOTH ENAMEL

A. R. Docking, Joan A. Donnison, C. R. Newbury and E. Storey. Austral. J. Den. 57:139 June 1953.

The object of this investigation was to study the effects of various cements on intact teeth banded as for orthodontic purposes and particularly to determine whether decalcification is evident in such teeth.

To study the surfaces of the teeth, replicas of the enamel surfaces were made, surface meter tests were conducted, and the surfaces were subjected to methyl violet dye to determine whether there were any changes in the contour of the surfaces or whether there was any increased affinity for the dye which would indicate possible decalcification.

A zinc phosphate and a red copper cement commonly used by Melbourne orthodontists for the cementing of bands and a typical silicate cement were chosen for the investigation. The cements were mixed to various consistencies, and they were used to cement orthodontic bands to extracted teeth which were reasonably sound and also to teeth *in vivo* that were to be extracted for orthodontic reasons.

The pH of the cements was evaluated electrometrically, and it was observed that the values increased from about pH 1 for the liquids to about pH 2 or 2.5 three minutes after the mixing was begun and between 3.5 and 5 two hours later.

The various cements were mixed to a thin consistency, which would be of practical value, and were used to cement orthodontic bands to place. When the bands and the cement were removed from the teeth, no change in the surfaces of the teeth had occurred.

Cements mixed to an unusually thin consistency did not cause any apparent surface attack on the enamel, but the areas which were contacted by these cements stained readily with methyl violet. The cause for the increased staining of these areas is a matter of conjecture. The thinnest consistency used, which did not set in 24 hours, produced decalcification of the enamel surface of the tooth. Grinding of the surface of the tooth rendered it more susceptible to decalcification by cement.

The bands placed on the teeth still in the mouth were cemented to place with the cement mixed to a standard consistency. No evidence was found of change in the surface detail of any of these teeth. It is suggested that it may be practical to use cement liquids saturated with calcium phosphate to prevent attachment to the enamel surface.

If etching of enamel does occur as a result of the cement used to place orthodontic bands, it is most likely to take place during the time the cement is setting when the acidity is high. What is required in orthodontics is a neutral cement which is resistant to attack under oral conditions and which will strip cleanly from the enamel on removal of the band.

Roy L. Lindahl

SOME FALLACIES ASSOCIATED WITH CHILDREN'S DENTISTRY

Bruce Lindsay. Austral. J. Den. 57:158 June 1953.

The dentist who works with children will have success if he is confident in his ability to handle the children. He does not have to enjoy their company; for if he prefers children to adults, he himself must have a childish mind. Success with children does not require any great love for them; indeed, as soon as emotional factors come into play, the operator's judgment and skill are affected.

The ability to handle children may be acquired in a short time. Patience helps, and this can be cultivated and improved with practice and experience. The use of anesthesia is an aid to the successful management of the child as is keeping the parent out of the operating room. The towel technic may be used to control any uncooperative child over three years of age who is afraid, obstinate or just spoiled. Confidence of the operator in his ability to handle the situation is important. The operator should not be afraid of the child but should look him straight in the eyes and never raise his voice or sound impatient. After the dentist has finished the child's treatment, he should present him with a souvenir, which is not given as a reward but as a token of good will.

Silver amalgam is not the only material which may be utilized to fill deciduous teeth properly. Copper amalgam also may be used; since it has greater crushing strength than silver amalgam, it does not need a base, and it does not expand after setting. It is essential that all caries be removed, that copper amalgam be placed in the proper cavities, with

proper form and retention. A satisfactory steel matrix must be used in Class II cavities.

If the operator is careful, exposures will be kept at a minimum. On the occlusal surface, strength must be obtained at the expense of width rather than of depth.

Dentistry for children does pay; with the proper discipline in the operating room, two restorations in deciduous teeth can be completed in a half-hour appointment. The fee per time basis is much better for the four to seven year old patients than for older children or adults.

The dentist's work should consist entirely of dental services; it is not his function to amuse children.

Roy L. Lindahl

FLUORESCENCE OF TEETH REVEALS STRUCTURE

George Dickson, A. F. Forziati, M. E. Lawson, Jr., and I. C. Schoonover. New York J. Den. 23:299 Aug.-Sept. 1953.

A technic that utilizes the natural fluorescence of teeth is being employed at the National Bureau of Standards to reveal hitherto undetected details of tooth structure. By this method fluorescent photomicrographs are obtained from the visible light emitted by very thin tooth sections under high-intensity ultraviolet radiation. The photomicrographs provide information on the distribution of the organic content of enamel and dentin and show developmental or growth lines with great clarity.

The spectrums of the fluorescence of tooth structures also have been investigated. Results obtained with large specimens indicate that dentin fluoresces approximately four times as intensely as enamel and that the fluorescence of enamel contains more of the yellow wave lengths than does that of dentin. Studies of smaller areas have shown a number of regions with a noticeably higher fluorescence than the rest of the tooth structure.

Joel Friedman

TEETH IN THE LINE OF FRACTURE: A CONCEPTION OF THE PROBLEM BASED ON A REVIEW OF 690 JAW FRACTURES

H. Krømer. Brit. D. J. 95:43 July 21, 1953.

The objective in treatment of a jaw fracture is to re-establish normal function and appearance as soon as possible. To accomplish this result, infection must be reduced to a minimum so that healing can proceed as rapidly as possible. The presence of a tooth in the line of fracture presents a problem the solution of which is controversial. Extraction or retention of such teeth must be decided according to each case.

For this study 690 cases of fractured jaw were classified as to the type of fracture: linear fractures with teeth in all fragments, gunshot fractures, fractures fixed after two to twelve weeks, fractures with a short edentulous fragment, multiple fractures with a short posterior edentulous fragment, partial or alveolar fractures and multiple and comminuted fractures.

For the multiple fractures with a short posterior edentulous fragment, the healing period was longer when there was no tooth in the line of fracture than when there was a tooth at the site of fracture. In all other groups the presence of a tooth in the line of fracture prolonged the healing time.

If the fracture is not the result of a gunshot and fixation is accomplished within 48 hours, the time for extracting a tooth in the line of fracture appears to be of subordinate significance. Teeth should be extracted from the line of fracture if fixation is accomplished later than 48 hours after the accident. A gunshot fracture wound is always infected, and teeth should be removed from the line of fracture unless it is considered advisable to wait for the infection to subside first. It is not necessary to remove unerupted teeth or impacted teeth from the line of fracture unless they interfere with proper fixation.

The earlier fixation and immobilization are effected, the greater are the chances of a satisfactory result.

Roy L. Lindahl

DESCRIPTION, CLASSIFICATION, AND ANALYSIS OF UNOPERATED CLEFTS OF THE LIP AND PALATE

Samuel Pruzansky. Am. J. Orthodont. 39:590 Aug. 1953.

Not all congenital clefts of the lip and palate are alike. Uniformity of terminology is essential to the development of a common and understandable language for describing all forms and degrees of cleft lip and palate and to the accumulation of statistical data.

Intelligent diagnosis and treatment planning in all specialties should be based on a study of the morphologic and physiologic factors observed in each individual case. Records derived from cephalometric roentgenograms and casts of the face and palate afford a

quantitatively accurate means for recording the spectrum of individual variations and for plotting the progress of each child in terms of his growth and response to various therapeutic procedures.

The question is often raised as to the point at which the interest of the orthodontist, of the speech pathologist or of the prosthodontist in the child with a cleft palate should begin. From the experiences gained over the past four years by a large multiprofessional group, the answer is quite clear. Everyone who seeks to serve the needs of the child with a cleft should begin at the beginning.

The material presented in this article was derived from a study of newborn infants with cleft lip and cleft palate, which is being carried out under the direction of the department of orthodontia in the cleft palate center of the Chicago professional colleges of the University of Illinois. The project derives support from a grant provided by the Children's Bureau of the Federal Security Agency. Now in its fourth consecutive year, this study has accumulated data on more than 350 different individuals. The largest portion of these cases are those of newborn infants.

A RADIOGRAPHIC CEPHALOMETRIC CONSIDERATION OF FACIAL GROWTH DURING ORTHODONTIC TREATMENT

Robert W. Donovan. Am. J. Orthodont. 39:340 May 1953.

Examination of the records of a large number of corrected malocclusions reveals a wide variation in time of treatment and in degree of success. It becomes apparent that factors other than mechanical orthodontic manipulation have an influence on results.

The quality of orthodontic results, the time required for treatment and the reaction to mechanical therapy are influenced by the following factors: (1) the anteroposterior relation of the mandible to the maxilla, (2) facial growth during orthodontic treatment, (3) direction of growth of facial structures (maxilla and mandible) during orthodontic treatment.

By means of cephalometric radiography it is possible to appraise accurately the anteroposterior relation of the mandible to the maxilla. Generally only by cephalometric radiography before orthodontic treatment can the growth trends of facial structures be appraised.

At the present time, amount, direction and time of growth cannot be anticipated in individual cases before orthodontic treatment.

William F. Ford

THE CARTILAGE OF THE NASAL SEPTUM. A CONTRIBUTION TO THE STUDY OF FACIAL GROWTH

J. H. Scott. Brit. D. J. 95:37 July 21, 1953.

The purpose of this paper is to postulate that the cartilage of the nasal capsule during fetal life and the septal cartilage after birth tend to push the superior maxillary bones in a direction downward and forward so as to increase the capacity of the mouth and thereby to make room for the development of the molar teeth and at the same time to deepen the cavities of the nasal fossae.

The cartilage of the nasal septum is an extension of the cartilage of the cranial base. The posterior part of the septum becomes ossified to form the perpendicular plate of the ethmoid bone, which is a bone of the cranial base and is at first separated everywhere from the facial bones by cartilage. Later, it unites with the lateral masses of the ethmoid bone and with the vomer bone. When these facial and cranial bones are united, growth of the posterior facial suture system ceases; and the facial sutures behind the maxilla are no longer sites of growth. This cessation of growth usually coincides with or precedes the eruption of the first members of the permanent dentition. In all mammals the front part of the septum remains cartilaginous, but in adult life it ceases to grow.

Roy L. Lindahl

THE EFFECTS OF VARIOUS LEVELS OF DIETARY PROTEIN ON THE PERIODONTAL TISSUES OF YOUNG RATS

Asger M. Frandsen, Hermann Becks, Marjorie M. Nelson and Herbert M. Evans. J. Periodont. 24:135 July 1953.

A study was made of the changes observed in the periodontal tissues of animals subjected to the effects of various levels of protein deprivation. Forty-six male rats of the Long-Evans strain were weaned when 21 days old and divided into seven groups. Four purified diets were used, varying in casein content. The control diet contained 24 per cent casein, whereas the deficient diets contained 6 per cent, 3 per cent and 0 per cent casein respectively. The casein deficit was compensated for by the same amount of sucrose, so that the diets were isocaloric.

The animals were killed between 63 and 67 days of age after approximately six weeks on the diets, and autopsies performed. The length of the experimental periods was de-

termined by the moribund condition of the protein-deficient animals.

It was found that the protein-deficient animals had smaller jaws and less osteocementum on the roots than the pair-fed controls. They showed also interference with the integrity of the interdental papillae, and when completely deprived of protein, pronounced disturbance of the transseptal fibers. Osteoporosis of the alveolar and supporting bone became accentuated with increasing protein deprivation and led to severe breakdown of bone tissue in the protein-free group in which an increased rate of resorption can be assumed. The normal distal shifting of the molars was arrested in the 3 per cent and 0 per cent casein groups and in the control animals for the 0 per cent group. This condition was indicated by the lack of apposition of bone on the distal surface of the interdental septums.

X-RAY SCATTERING STUDY OF TOOTH STRUCTURE

A. S. Posner. New York J. Den. 23:303 Aug.-Sept. 1953.

X-ray low-angle scattering technics are being employed at the National Bureau of Standards to provide information on the structure of teeth. This method has demonstrated the presence of particles about 50 angstroms in size in bone and tooth mineral and thus lends weight to the admixture theory of bone and tooth structure. The particles, which are beyond the resolving limits of the electron microscope and normal x-ray diffraction methods are thought to be the sites of the sodium, carbonate, magnesium citrate and other inorganic ions that appear among the minor constituents of tooth and bone material. Their influence on tooth decay is yet to be determined.

Joel Friedman

DENTAL OBSERVATIONS ON AUSTRALIAN ABORIGINES: YUENDUMU, CENTRAL AUSTRALIA, 1951-52

M. J. Barrett. Austral. J. Den. 57:127 June 1953.

Dental observations were made of a group of aborigines at Yuendumu, Central Australia, during two separate visits in August 1951 and May 1952. A total of 224 natives were examined. During the second visit 34 children received a second examination.

Except for some of the children born at the settlement within the last two or three years, accurate information concerning the ages of the natives examined was not available. The ages of the school children were estimated with the aid of school records correlated with dental and medical examinations. The ages of the older children and young adults were determined by observation of their tooth eruption patterns and of the adults by their general physical development.

The dental examinations were conducted with the aid of a mouth mirror and a probe. Forty-six natives examined in August 1951 received a bitewing roentgenographic examination. Less than one third (30.6 per cent) of the Yuendumu natives had one or more carious teeth; of the total number of teeth recorded, only 5 per cent were affected. A variable which was not taken into account in this comparison was the age distribution of the subjects. The low figures for caries occurrence in Yuendumu natives resulted, to some extent, from the greater proportion of young children in this group. Yuendumu has been established as a native settlement for a relatively short time; many of the natives had had rare or only occasional contact with white people before the establishment of the settlement.

In this study it was noted that the incidence of caries increased with age. The occurrence of decayed and missing teeth ranged from 0.2 per juvenile subject to 11.3 per aged subject. Likewise the percentage with decayed and missing teeth ranged from 13 per cent of juvenile subjects to 95 per cent of aged subjects.

The frequency of caries on the right side and that on the left side were almost exactly the same. The ratio of carious teeth in the lower arch compared with the ratio of carious teeth in the upper arch was 3:1 in the deciduous dentition and 3:2 in the permanent dentition.

Occlusal attrition was noted in all natives except some of the infants with incomplete deciduous dentitions. Compared with previous studies this group showed less attrition in the children and young adults and greater occlusal wear in the older natives.

The diet of this group of natives is high in carbohydrates with a resultant weakness in certain nutritional requirements. There is a low calcium intake with a probable calcium-phosphorus imbalance and a deficiency of vitamins C and D.

The water supply is relatively high in fluoride content, and some of the children showed mild dental fluorosis. It was not possible to determine how long the natives had been drinking this water.

The food which the Yuendumu natives eat

is of such a nature as to require little masticatory effort, and some of the food becomes contaminated with foreign material that causes attrition of the teeth. A lack of attrition in the younger natives indicates a smaller amount of foreign material in the food compared with that found in the primitive native diet.

There appeared to be more evidence of adverse gingival conditions in this group than in groups previously studied living in their native habitat.

In a number of young aborigines an unusual feature of occlusal relation was noted. The establishment of the final position of interlocked cuspal occlusion is not simultaneously bilateral but in functional operation is a unilateral condition of occlusion. Crowding and malposition of the teeth of Australian aborigines are not uncommon.

Roy L. Lindahl

INTEGRATION OF ANATOMIC AND CEPHALOMETRIC STUDIES OF GROWTH OF THE HEAD

Edmund Applebaym. Am. J. Orthodont. 39:612 Aug. 1953.

A course for freshman dental students in development of the head is described as follows: "Each student has several sections of each fetal head so as to obtain a picture of different space levels in a given plane of section. Horizontal, frontal and sagittal sections of fetal heads at different age levels are also studied, thus giving the student a composite mental picture of the normally growing head as a space-time structure."

The use of such material for graduate students in orthodontics causes conflict, that is, conflict between the Broadbent concept of the development of the head and the ideas conceived by some anatomists from a study of histologic sections of fetal material and from animal experiments. In this paper an attempt is made to reconcile the conflict; it is shown that histologic evidence from human prenatal material can be oriented in and reconciled with the Broadbent frame of reference, which gives a more comprehensive understanding of the development of jaws and teeth in relation to the cranium.

William F. Ford

A STUDY OF THE MANDIBULAR THIRD MOLAR AREA

Benjamin Cory Ledyard, Jr. Am. J. Orthodont. 39:366 May 1953.

This study was undertaken with the idea of attempting to cast some light on the third molar problem for the orthodontist. The third molar has been a frequent topic for discussion among general dentists and oral surgeons as well as among orthodontists.

From the orthodontist's point of view, the third molar has long been considered a menace to his finished result, and more times than not the tooth has been removed as a routine practice without a considered diagnosis. If the third molar had not been removed and a relapse occurred after treatment, this tooth was immediately considered the cause of this failure.

In this study 375 tracings were made of both right and left lateral jaw roentgenograms. These roentgenograms were taken of the teeth of orthodontic patients only. Measurements were made on the tracings from the distal border of the lower first molar on the occlusal plane to the anterior border and posterior border of the ramus. Three hundred and twenty of these measurements were placed on a scattergram.

A method of appraisal of the third molar region was shown as a possible prognosis for the third molar at the beginning and end of orthodontic treatment. The average measurements for each year were charted on a table; a study of the table revealed the following facts:

1. The average amount of growth from the lower first molar to the anterior border of the ramus from 8 years to 14 years was 7.7 mm. The average growth from 14 years to an average of the ages from 16 to 20 years was 2.3 mm .

2. The average growth from the lower first molar to the posterior border of the ramus was 6.6 mm. from 8 to 14 years, while 2.5 mm. of growth occurred thereafter.

Certainly, at the age of 15 to 16 years, when further growth in the retromolar region is negligible, a comparison of tooth and bone structure would determine whether sufficient space was present for the third molar.

William F. Ford

Deaths

Allen, Alexander R., South Williamsport, Pa.; College of Dental Surgery, University of Michigan, 1893; died October 24; aged 85.

Allen, Herbert A., Randolph Center, Vt.; College of Dental Surgery, University of Michigan, 1893; died October 22; aged 89.

Bacon, William R., San Francisco; College of Dentistry, University of California, 1899; died November 25; aged 77.

Baker, Chester A., Washington, D. C.; Dental Department, National University, Washington, D. C., 1902; died November 21; aged 76.

Ball, Calvin C., Huntington, W. Va.; Cincinnati College of Dental Surgery, 1913; died July 31; aged 79.

Baxter, John C., Independence, Calif.; College of Dentistry, University of California, 1901; died November 5; aged 77.

Becker, Ottmar A., Milwaukee; Dental School, Northwestern University, 1900; died October 30; aged 75.

Belknap, Chester G., Canton, Ohio; Cincinnati College of Dental Surgery, 1917; died October 21; aged 60.

Berg, Bernard, Boston; Dental School, Tufts College, 1917; died December 1; aged 59.

Blackmore, Edwin C., Hampton, Va.; died September 20.

Block, Herman S., Kerrville, Texas; College of Dentistry, Ohio State University, 1936; died July 7; aged 41.

Blomenkamp, August E., Hastings, Neb.; College of Dentistry, University of Nebraska, 1918; died August 29; aged 62.

Botterbush, Wilmer G., Alton, Ill.; College of Dentistry, University of Illinois, 1928; died October 15; aged 47.

Brooks, Charles R., Grosse Pointe Farms, Mich.; Department of Dental Surgery, Detroit College of Medicine, 1907; died October 17.

Bukacek, Bud J., Wichita, Kan.; College of Dentistry, University of Nebraska, 1928; died October 15; aged 48.

Burd, Simon A., Salem, N. J.; School of Dentistry, Temple University, 1931; died November 21; aged 45.

Burton, Harry B., Kansas City, Mo.; School of Dentistry, Washington University, St. Louis, 1919; died October 24; aged 59.

Carey, Thomas W. Jr., New Orleans; died October 13; aged 77.

Casey, Maurice A., North Adams, Mass.; School of Dentistry, Georgetown University, 1919; died November 1; aged 57.

Cox, Norman J., Minneapolis; College of Dentistry, University of Minnesota, 1901; died November 14; aged 79.

Crume, Hubert J., El Dorado, Ark.; School of Dentistry, St. Louis University, 1908; died October 30; aged 72.

Daly, Thomas H., Mount Carmel, Ill.; Dental School, Northwestern University, 1901; died October 14; aged 78.

Davis, Morgan W., Osage, W. Va.; Baltimore College of Dental Surgery, 1919; died November 3; aged 60.

Davis, William J., Washington, D. C.; School of Dentistry, Georgetown University, 1911; died October 11.

Derham, Francis E., San Rafael, Calif.; College of Physicians and Surgeons, San Francisco, 1913; died November 13; aged 61.

Dougall, Donald M., Avon, N. J.; School of Dentistry, University of Pennsylvania, 1912; died in November, aged 64.

Dunn, Robert J., Bradford, Pa.; School of Dentistry, University of Pittsburgh, 1932; died November 4; aged 47.

Dye, John B., Grandview, Wash.; School of Dentistry, North Pacific College of Oregon, 1913; died November 1; aged 73.

Eastman, James B., Washington, D. C.; Indiana Dental College, 1913; died October 20; aged 62.

Elbert, Nuchim, St. Louis; died October 29; aged 45.

Fine, Victor, Swampscott, Mass.; died November 6; aged 59.

Fischbein, Louis J., Newark, N. J.; Pennsylvania College of Dental Surgery, Philadelphia, 1902; died November 6; aged 71.

Fischbein, Mathilda, Newark, N. J.; died October 28; aged 75.

Fletcher, Freeman F., Erskine, Minn.; College of Dentistry, University of Minnesota, 1902; died October 15; aged 81.

Foote, Charles T., Janesville, Wis.; Dental School, Marquette University, 1911; died August 10; aged 65.

Freeman, Milton L., Philadelphia; Pennsylvania College of Dental Surgery, 1905; died September 30.

Fuselier, Joseph O., Jeanerette, La.; Louisville College of Dentistry of Centre College, 1904; died October 20; aged 77.

Gill, Harry C., Princeton, Ill.; Chicago College of Dental Surgery, Loyola University, 1910; died November 11; aged 66.

Glover, William M., Chicago; Dental Department, Meharry Medical College, 1910; died November 24; aged 69.

Griffin, James L., Fort Worth; School of Dentistry, Vanderbilt University, 1899; died July 16; aged 77.

Griffin, William L. J., Philadelphia; Pennsylvania College of Dental Surgery, Philadelphia, 1900; died October 23; aged 75.

Griffith, John J., Bridgeport, Ill.; Ohio College of Dental Surgery, University of Cincinnati, 1905; died October 22; aged 71.

Guilfoyle, William J., Ogallala, Neb.; College of Dentistry, University of Iowa, 1946; died October 26; aged 32.

Hanna, J. Glenn, West Brighton, N. Y.; died October 28.

Hanson, Herman P., San Jose, Calif.; College of Dentistry, University of California, 1897; died November 12; aged 79.

Henry, Clare M., Bernardsville, N. J.; School of Dentistry, University of Pennsylvania, 1898; died October 26; aged 77.

Hill, William Z., Philadelphia; School of Dentistry, University of Pennsylvania, 1911; died November 10.

Jackson, Frederick J., Fall River, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1916; died October 27.

Jacquin, George I., Upper Montclair, N. J.; School of Dentistry, Temple University, 1915; died November 13; aged 62.

Jennings, George P., Watsonville, Calif.; Dental School, Northwestern University, 1902; died October 14; aged 83.

Johnson, Cyrus P., Longview, Wash.; School of Dentistry, North Pacific College of Oregon, 1919; died November 29; aged 59.

Johnson, Edwin C., Ripon, Wis.; Dental School, Marquette University, 1915; died November 1; aged 63.

Kelly, George M., Syracuse, N. Y.; School of Dentistry, University of Pennsylvania, 1917; died November 6; aged 62.

Kison, Herbert S., McKeesport, Pa.; died October 24.

Knieper, William P., Indianapolis; School of Dentistry, Indiana University, 1925; died November 5; aged 51.

Koch, Max C. P., Maplewood, N. J.; New York College of Dentistry, 1902; died November 7; aged 74.

Kunker, Frank E., Albany, N. Y.; Dental School, Harvard University, 1917; died August 25; aged 60.

Landgrave, John P., Peru, Ind.; School of Dentistry, Indiana University, 1927; died November 1; aged 50.

Landing, Harold M., Kelso, Wash.; Dental School, Marquette University, 1918; died in November.

Lauraitis, Alphonsus R., Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died November 18; aged 67.

Lundgren, Elizabeth F., Lincoln, Neb.; died August 15.

MacDonald, Robert D., Grosse Pointe Farms, Mich.; College of Dental Surgery, University of Michigan, 1918; died October 22; aged 57.

Mead, Charles R., Blair, Neb.; Chicago College of Dental Surgery, Loyola University, 1898; died August 28; aged 84.

Miller, Otis A., Parsons, W. Va.; died September 10.

Millett, Louis D., Pawtucket, R. I.; Boston Dental College, 1892; died October 16; aged 83.

Mills, Ross W., Philadelphia; Pennsylvania College of Dental Surgery, Philadelphia, 1900; died October 17.

Morgan, James A., Clairton, Pa.; School of Dentistry, University of Pittsburgh, 1921; died November 11; aged 55.

Morgart, Sam M. F., Roaring Spring, Pa.; School of Dentistry, University of Pittsburgh, 1921; died November 3; aged 59.

Mortonson, James C., Milwaukee; Chicago College of Dental Surgery, Loyola University, 1906; died October 24; aged 72.

Mullen, Harry E., Jr., Mechanicsburg, Pa.; School of Dentistry, University of Pennsylvania, 1928; died October 12; aged 53.

Nerud, Charles W., Elroy, Wis.; Chicago College of Dental Surgery, Loyola University, 1898; died October 15; aged 81.

Nichols, Ira G., Champaign, Ill.; Dental School, Northwestern University, 1911; died October 26; aged 64.

Norris, George W., Los Angeles; College of Dentistry, University of Minnesota, 1900; died November 5; aged 75.

Olshan, James H., Chicago; Dental School, Northwestern University, 1918; died September 29; aged 56.

Paul, Frank H., Erie, Pa.; Philadelphia Dental College, 1899; died October 28; aged 78.

Pearlin, Harry J., Quincy, Mass.; Dental School, Tufts College, 1914; died August 9; aged 66.

Peltz, David, Highlands, N. J.; Dental School, Tufts College, 1936; died November 19; aged 40.

Perkins, Philip J., Belmont, Calif.; died September 4.

Pohle, Max W., Madison, Wis.; Dental School, Northwestern University, 1924; died November 7; aged 51.

Pratt, Frank H., Seattle; School of Dentistry, North Pacific College of Oregon, 1916; died November 13; aged 67

Quirk, John F., Jr., San Jose, Calif.; died November 9.

Read, Edwin H., Perry, N. Y.; School of Dentistry, University of Buffalo, 1901; died August 3; aged 75.

Robertson, Carl B., Des Moines, Iowa; College of Dentistry, Creighton University, 1907; died November 12; aged 69.

Robinson, John A., St. Louis; Marion-Sims Dental College, 1905; died September 27; aged 76.

Rode, Ralph B., St. Louis; School of Dentistry, St. Louis University, 1916; died November 5; aged 60.

Rosamilia, Peter A., Newark, N. J.; School of Dentistry, University of Pennsylvania, 1928; died November 29; aged 52.

Schacht, Carl W., Jackson ,Calif.; College of Physicians and Surgeons, San Francisco, 1901; died October 18.

Schillinger, Charles W., Dixon, Mo.; School of Dentistry, Washington University, St. Louis, 1903; died October 19; aged 72.

Schwartz, Bernhardt F., Lincoln, Neb.; Dental School, Northwestern University, 1904; died October 30; aged 76.

Schwartz, Charles L., St. Louis; Barnes Dental College, 1911; died October 9; aged 62.

Sennett, John H., Youngstown, Ohio; School of Dentistry, University of Pittsburgh, 1926; died October 30; aged 48.

Serafino, Joseph P., Beaumont, Texas; Texas Dental College, Houston, 1925; died October 30; aged 56.

Shipley, James L., Rockford, Ill.; Dental School, Northwestern University, 1915; died November 10; aged 61.

Sowles, Mark D., Boston; Dental School, Harvard University, 1925; died November 11; aged 53.

Speidel, Immanuel G., Buffalo; School of Dentistry, University of Buffalo, 1914; died October 16; aged 62.

Spendico, George A., Minot, S. D.; Dental School, Marquette University, 1919; died November 8; aged 56.

Stevens, Johanna R., Walpole, Mass.; Boston Dental College, 1897; died October 23; aged 76.

Storer, John W., Wheeling, W. Va.; School of Dentistry, University of Pennsylvania, 1894; died September 22; aged 80.

Swanson, Carl A., Ubly, Mich.; College of Dental Surgery, University of Michigan, 1933; died October 13; aged 30.

Swanston, Joseph A., St. Louis; School of Dentistry, St. Louis University, 1900; died October 12; aged 53.

Sweet, Thomas R., Oakland, Calif.; College of Dentistry, University of California, 1916; died November 24; aged 64.

Tierney, Joseph J., Dorchester, Mass.; Dental School, Harvard University, 1921; died November 1; aged 55.

Timmerman, Thomas L., Laurens, S. C.; Atlanta Dental College, 1910; died October 20; aged 68.

Toraason, Hiram W., Spring Valley, Ill.; Dental School, Northwestern University, 1921; died November 5; aged 59.

Turkington, David C., Chester, Pa.; School of Dentistry, Temple University, 1909; died November 20; aged 66.

Vaughan, Hugh A., Bradenton, Fla.; Department of Dentistry of Central University, Richmond, 1898; died September 4; aged 88.

Waller, Cyril A., Brooklyn; College of Dental and Oral Surgery, New York, 1918; died November 16; aged 57.

Waterman, Richard C., Denton, Texas; Indiana Dental College, 1921; died November 10; aged 58.

West, Henry G., New Haven, Conn.; School of Dentistry, Temple University, 1910; died October 31; aged 64.

Whitcomb, Charles R., Galloway, Tenn.; died October 17.

White, George M., Lewistown, Mont.; Kansas City Dental College, 1908; died November 9; aged 70.

Wikeen, John R., Honolulu, T. H.; College of Dentistry, University of Iowa, 1917; died November 23; aged 61.

Wilkinson, Lex E., Indianapolis; Indiana Dental College, 1914; died November 11; aged 60.

Williams, John H., Seattle; died September 6.

Windes, Kenneth W., Oklahoma City; College of Dentistry, Baylor University, 1927; died October 26; aged 30.

Windle, Frank W., Joplin, Mo.; Kansas City-Western Dental College, 1924; died September 11; aged 56.

Wood, Leon A., Springfield, Ohio; School of Dentistry, Western Reserve University, 1902; died August 29; aged 84.

Woodbury, Victor A., Kansas City, Kan.; died October 13; aged 60.

Wycall, Theodore L., Newark, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1934; died November 27; aged 44.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami, Fla.
Ninety-Sixth Annual Session	Oct. 17-20, 1955	San Francisco
Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N.J.

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 25-27	Biloxi, Miss.	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska	Aug. 2-5	Anchorage	C. J. Pearson	500 K St., Anchorage
Arizona	Apr. 21-24	Phoenix	E. M. Scott	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 4-7	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 26-28	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	May 3-5	Los Angeles	J. P. Bowers	124 W. Lime Ave., Monrovia
Colorado	Oct. 3-6	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	June 2-4	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			J. C. Baker	Mayfair Apts., Sec. C., 1300 Harrison St., Wilmington
District of Columbia	June 8	Washington	Z. B. Lloyd	2007 R St., N.W., Washington
Florida	Apr. 25-28	Daytona Beach	B. S. Carroll	706 Professional Bldg., Jacksonville
Georgia	Oct. 10-13	Atlanta	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	June 23-26	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	Apr. 29, 30	Boise	C. G. Hanson	409 11th Ave., S., Nampa
Illinois	May 10-13	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria
Indiana	May 17-19	Indianapolis	E. E. Ewbank	Box 96, Kingman
Iowa	May 3-5	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 16-19	Wichita	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Apr. 5-7	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 21-24	Baton Rouge	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 24-26	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 3-5	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore
Massachusetts	May 2-5	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 25-28	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota			C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 5-8	Biloxi	B. A. Cohen	306 Plaza Bldg., Jackson
Missouri	June 13-16	St. Louis	E. D. Suggett	201 Merchants Bank Bldg., Jefferson City
Montana	May 6-8	Great Falls	E. G. Vedova	Roundup
Nebraska	May 10-12	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June 18-20	Reno	O. M. Seifert	506 Humboldt St., Reno
New Hampshire	June 13-15	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 4-6	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 23-26	Santa Fe	J. S. Elinr	Medical Arts Square, Albuquerque
New York	May 10-12	Buffalo	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 16-19	Pinehurst	R. D. Coffey	Kibler Bldg., Morganton
North Dakota	May 23-25	Bismarck	V. B. Keltgen	317 de Lendrecie Bldg., Fargo
Ohio	Oct. 17-20	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23	Oklahoma City	D. Robertson	434 N.W. 13th St., Oklahoma City
Oregon	Mar. 1-3	Portland	W. H. Hurley	306 Selling Bldg., Portland
Panama Canal Zone			A. L. Teitel	U.S. Naval Station, Rodman
Pennsylvania	Oct. 5-7	Pittsburgh	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			F. Ordoñez	1558 Ponce de León Ave., Stop 23, Santurce
Rhode Island			N. G. Migliaccio	1467 Westminster St., Providence
South Carolina	May 23-25	Columbia	J. R. Owings	7 Medical Court, Greenville

State	Date	Place	Secretary	Address
South Dakota	May 20-22	Sioux Falls	L. N. Thelen	310A W. 18th St., Sioux Falls
Tennessee	May 10-12	Chattanooga	W. L. McCulley	Brown Bldg., Cleveland
Texas	Apr. 25-29	Dallas	W. Ogle	3607 Gaston Ave., Dallas
Utah	Apr. 8-10	Salt Lake City	K. L. Dedekind	914 Medical Arts Bldg., Salt Lake City
Vermont	May 16-18	Woodstock	W. J. Reardon	18 Madison St., Rutland
Virginia	Apr. 12-14	Richmond	W. T. McAfee	705 Colonial National Bank Bldg., Roanoke
Washington	Mar. 25-27	Seattle	W. B. Martin	Medical-Dental Bldg., Seattle
West Virginia	July 25-28	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 20-22	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming	June 20-23	Rock Springs	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 21-24*†	Birmingham	W. L. McCarty	200 Professional Center, Montgomery
Alaska			P. H. Williams	Box 2122, Juneau
Arizona			R. K. Trueblood	107 East A Ave., Glendale
Arkansas	June 21-25*†	Little Rock	H. O. Weatherly	205 Halter Bldg., Conway
California	June 21	Los Angeles	K. I. Nesbitt	507 Polk St., San Francisco
	July 26	San Francisco		
Colorado	June 21-25	Denver	C. K. Phillips	724 Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware	June 28-30*†	Wilmington	P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	Suite 718, 1835 Eye St., N.W., Washington
Florida	July 12-22*†	Jacksonville	A. W. Kellner	P. O. Box 133, Hollywood
Georgia			S. H. Yarbrough	12 Medical Arts Bldg., Columbus
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			R. E. Blickenstaff	1023 Fourth St., S., Nampa
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana	June 15-18*†	Indianapolis	C. A. Frech	504 Broadway, Gary
Iowa	May 24-28*†	Iowa City	D. J. FitzGerald	615 Brick & Tile Bldg., Mason City
Kansas	June 1-4	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Kentucky	June 7-10	Louisville	R. M. Justice	1330 Central Ave., Ashland
Louisiana	June 6-10	New Orleans	R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 7-9‡		H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts	June 21-25*‡		R. A. Barrette	Rm. 33, State House, Boston
	June 23-25†‡			
Michigan	June 6-12	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit
Minnesota	June 14-18	Minneapolis	M. G. Walls	1470 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 15-17	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri	June 7-12	St. Louis	R. R. Rhoades	414 Central Trust Bldg., Jefferson City
		Kansas City		
Montana	July 12-16	Helena	V. J. Quinn	301 Phoenix Bldg., Butte
Nebraska	June 7-11	Lincoln	H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada	June 21	Reno	R. Whitehead	Suite 6, Masonic Temple, Reno
New Hampshire	June 18, 19	Boston	S. G. Markos	8 Renaud Ave., Dover
New Jersey	June 2-4*	Trenton	W. A. Wilson	150 E. State St., Trenton
	June 7, 8*	Philadelphia		
	June 14, 15*	New York		
	June 23, 24†	New York		
New Mexico	June 26-29	Santa Fe	J. J. Clarke, Sr.	Artesia
New York	June 24, 25*‡		D. W. Beier	23 S. Pearl St., Albany
	June 29-July 2*‡			
	June 24, 25†‡			
	June 29, 30†‡			
North Carolina	June 28-July 2	Chapel Hill	F. O. Alford	1109 Liberty Life Bldg., Charlotte
North Dakota	July 12-16	Fargo	A. L. Pushor	Lisbon
Ohio	June 17-19	Columbus	H. B. Smith	322 E. State St., Columbus
	June 21-23			

State	Date	Place	Secretary	Address
Oklahoma			R. P. Keidel	403 Surety Bldg., Muskogee
Oregon	June 14-17	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	June 22-27*†	Philadelphia	A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina	June 17-19	Columbia	T. C. Sparks	1315 Pickens St., Columbia
South Dakota	June 20-23	Sioux Falls	H. T. Aker	Canton
Tennessee	June 14-18	Memphis	F. S. Maxey	804 Bennie Dillon Bldg., Nashville
Texas	June 13-19*	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			N. E. Munk	201 Cache Valley Bank Bldg., Logan
Vermont	June 28-30	Burlington	P. M. Fitch	Newport
Virginia	June 14-18* June 14-16†	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia	June 21-23*†	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 14-18*†	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. A. Hocker	212 &O S Bldg., Casper

*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. §Approximate dates—verify with state dental examining board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Apr. 11	Miami Beach, Fla.	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
Algerian Federation of Dental Societies	Apr. 12-18	Oran, Algeria	J. Nahon-Fauchier	Maison Du Medecin, 6, Rue Général Joubert, Oran, Algeria
American Academy of Dental Medicine	May 14-16	Philadelphia	W. M. Greenhut Secy.	124 E. 84th St., New York
American Association of Dental Schools	Mar. 22-24	French Lick, Ind.	M. W. McCrea Secy.	Baltimore College of Dental Surgery, University of Maryland, Baltimore
American Association of Orthodontists	May 16-20	Chicago	F. A. Squires Secy.	Medical Centre, White Plains, N. Y.
American Board of Oral Surgery	May 8-10	Chicago	L. M. FitzGerald Secy.	718 Roshek Bldg., Dubuque, Iowa
American Board of Orthodontics	May 11-15	Chicago	C. E. Martinek Secy.	661 Fisher Bldg., Detroit
American Dental Society of Europe	July 6-9	Paris, France	J. P. Molony Hon. Secy.	110 Harley St., London W.1, England
American Society for the Advancement of General Anesthesia in Dentistry	Mar. 22	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York
American Society of Oral Surgeons	Nov. 3-6	Hollywood, Fla.	R. F. Whalen Exec. Secy.	1112 E. Clay St., Richmond, Va.
British Dental Association	May 10-14	Blackpool, England	H. P. Buchanan Secy.	13 Hill St., Berkeley Square, London W.1, England
Chicago Dental Society	Feb. 6-9, 1955	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati March Clinic Meeting	Mar. 21-23	Cincinnati	P. McMullen Exec. Secy.	123 E. Sixth St., Cincinnati
Council on Dental Education, Dental Aptitude Tests	Mar. 5, 6		S. Peterson Secy.	222 E. Superior St., Chicago
District of Columbia Dental Society Postgraduate Clinic	Mar. 14-17	Washington	Z. B. Lloyd Secy.	2007 R St., N.W., Washington
Federation Dentaire Internationale	June 6	The Hague, Netherlands	G. H. Leatherman Secy. Gen.	35, Devonshire Place, London W.1, England
Fifth Annual Berkshire Conference	June 20-24	Falmouth, Mass.	I. Glickman	Tufts College Dental School, 136 Harrison Ave., Boston
International Association for Dental Research	Mar. 19-21	French Lick, Ind.	E. H. Hatton Secy.	311 E. Chicago Ave., Chicago

Name	Date	Place	Secy. or Chm.	Address
Italian Congress of Dentistry and Stomatology, Twenty-ninth Congress	Sept. 13-18	Venice, Italy	U. Saraval Dir.	Campo Manin 4017, Venice, Italy
National Board of Dental Examiners	Mar. 29, 30		G. J. Casey Secy.	222 E. Superior St., Chicago
Ninth Pacific Coast Dental Conference	June 1-5	Banff, Alberta, Can.	H. B. Powell Secy.	Greyhound Bldg., Calgary, Alberta, Can.
Northeastern Society of Orthodontists	Mar. 8, 9	New York	O. Jacobson Secy.	35 W. 81st St., New York
Pacific Coast Society of Prosthodontists	May 29,30	Seattle	A. W. Spaulding Secy.	4350 Eleventh Ave., Los Angeles
Southeastern Academy of Prosthodontics	Mar. 20, 21	Atlanta, Ga.	R. W. Durham Secy.	1001 Bankers Insurance Bldg., Macon, Ga.
Southern Academy of Oral Surgery	Mar. 12-14	Savannah, Ga.	R. F. Sullivan Secy.	118 Jones St., E., Savannah, Ga.
Southern Academy of Periodontology	Mar. 28-30	New Orleans	E. L. Banks Secy.	Candler Bldg., Atlanta, Ga.
Thomas P. Hinman Mid-Winter Clinic	Mar. 21-24	Atlanta, Ga.	S. Holbrook Exec. Secy.	15 Peachtree Place, N.W., Atlanta, Ga.

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Laboratory Fees in Hospital	5.00	10.00	15.00	20.00
Operating Room in Hospital	10.00	20.00	30.00	40.00
Anesthetic in Hospital	10.00	20.00	30.00	40.00
X-Ray in Hospital	10.00	20.00	30.00	40.00
Medicines in Hospital	10.00	20.00	30.00	40.00
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COSTS (Quarterly)				
Adult	2.50	5.00	7.50	10.00
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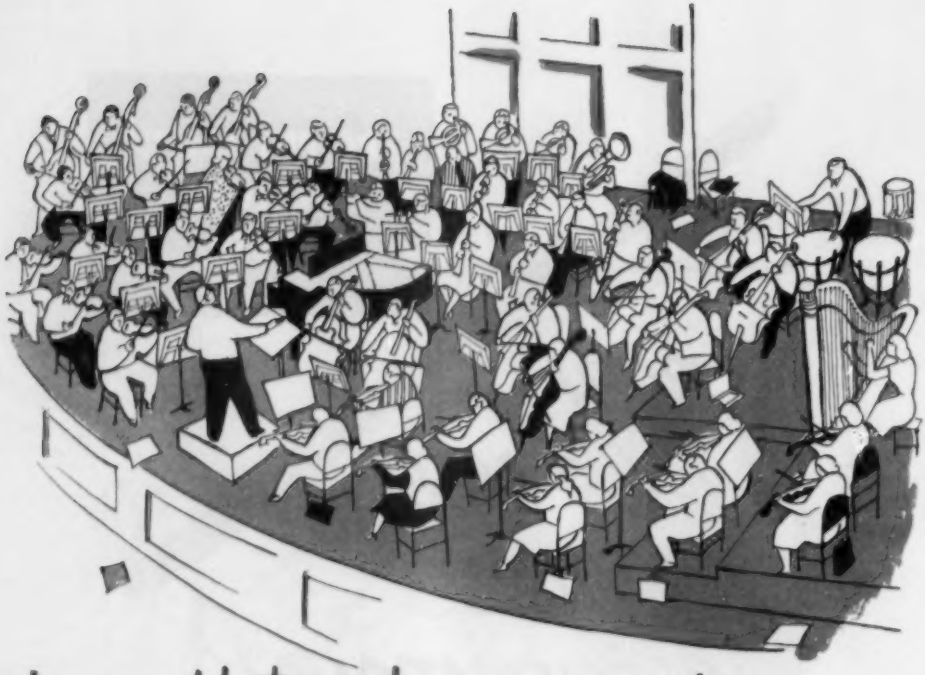

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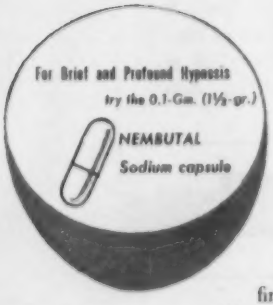

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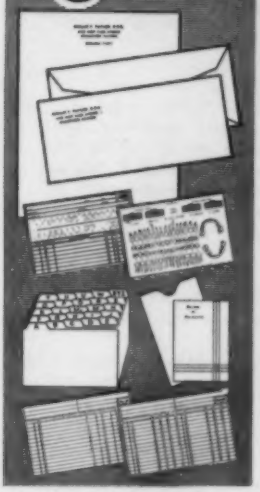

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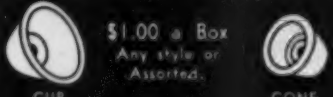

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Individual Termination —The insurance of each insured member will continue in force concurrently with the group policy and will only be terminated by reason of any of the following conditions:

a. If the group policy is terminated.

b. If the insured member fails to pay the required premium.

c. If the insured member ceases to be a member of the American Dental Association.

d. If the insured member retires or ceases to be actively engaged in the dental profession.

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(Applicable to ages at entry and attained at annual renewal date of the group policy, which is November 1 of each calendar year. Renewal rates do not change on attainment of age 65.)

			SEMI-ANNUAL RATES			
Monthly Benefits	Accidental Death Benefit	Dismemberment Benefits	Ages Up To 50	Ages 50 to 60	Ages 60 to 65	Ages** 65 to70
$100.00	$3,000.00	$ 5,000.00	$16.05	$18.30	$22.80	$26.30
$200.00	3,000.00	10,000.00	30.15	34.65	43.65	50.65
$300.00	3,000.00	15,000.00	44.25	51.00	64.50	75.00
$400.00	3,000.00	20,000.00	58.35	67.35	85.35	99.35

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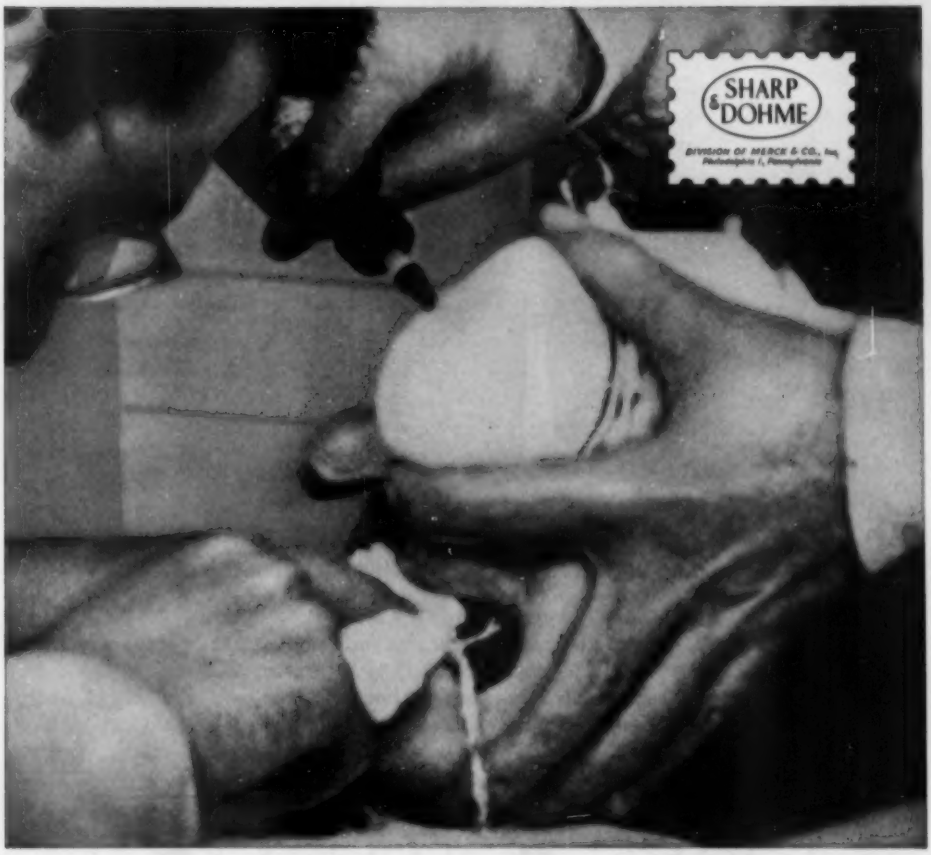

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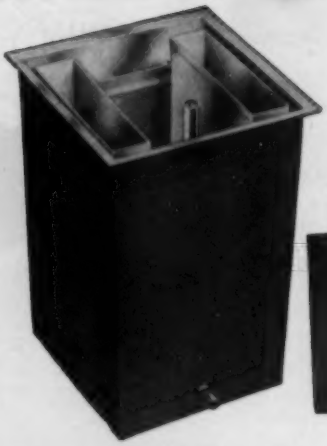

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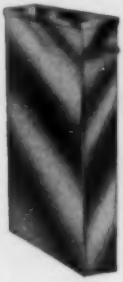

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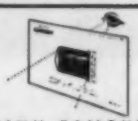

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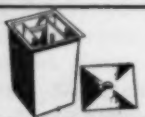

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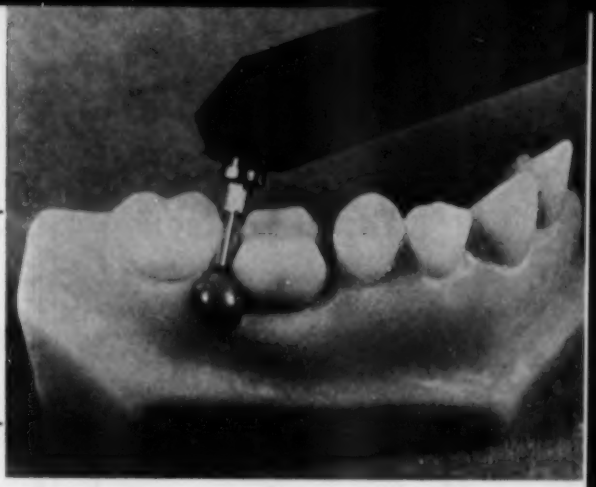

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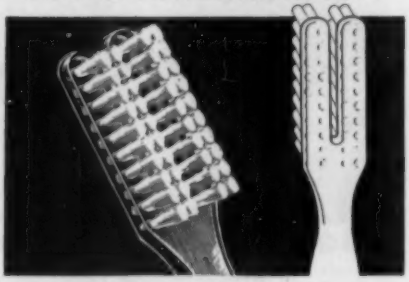

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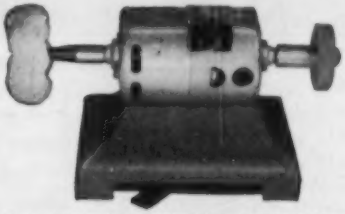

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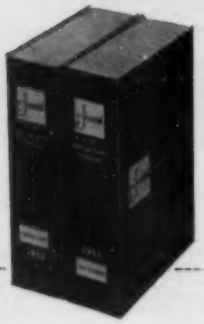

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1954 graduate Ohio State College of Dentistry, veteran, family man, desires association with ethical established California dentist, contingent on passing California State Board examination in July 1954. Address A.D.A. Box No. 596.

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Oral Surgeon, internship, residency, teaching experience. Two years Army oral surgeon at general hospitals and surgical mobile hospital. Desires association with established surgeon or clinic. Address A.D.A. Box No. 597.

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Young, personable, veteran, draft-exempt dentist, with excellent training and six years experience, desires permanent association in mid-town Manhattan practice. Will complete orthodontic course mid-April. Excellent references. Address A.D.A. Box No. 598.

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Orthodontist, nine years orthodontic and complete oral rehabilitation experience, outstanding qualifications. Seeks orthodontic association New York City or within radius of 100 miles. Military obligation completed. Address A.D.A. Box No. 601.

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(1) Lewison, E. F. Archives of Surgery, May 1950. Vol. 60, pp. 865-878.

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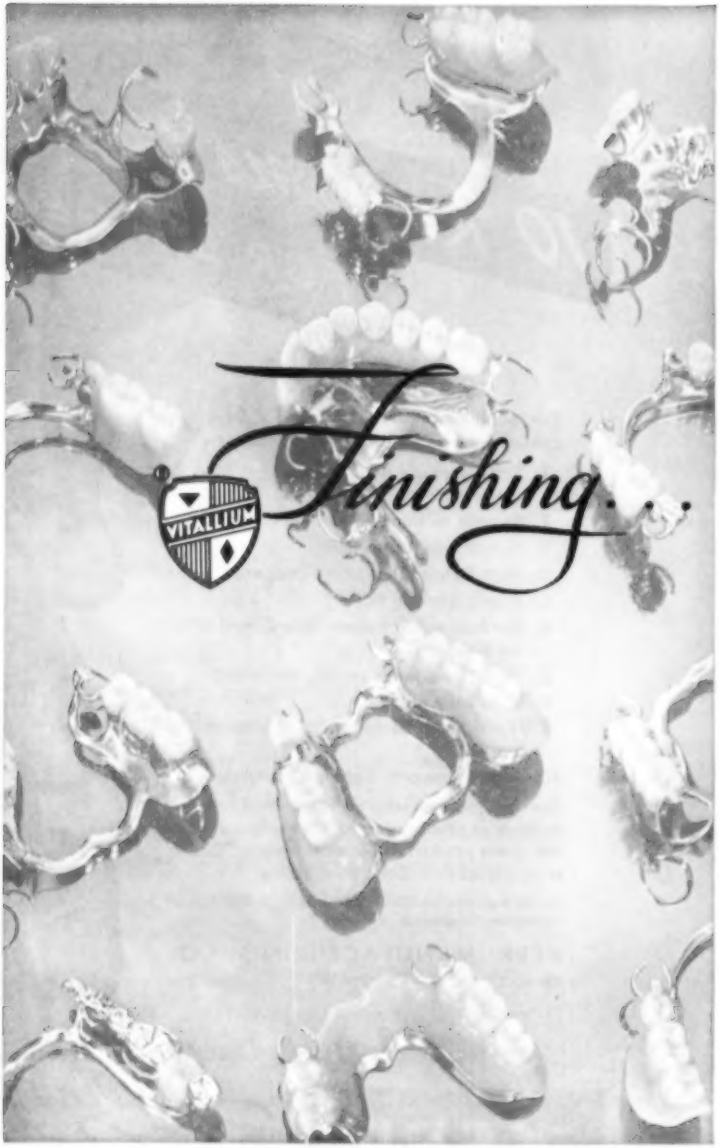
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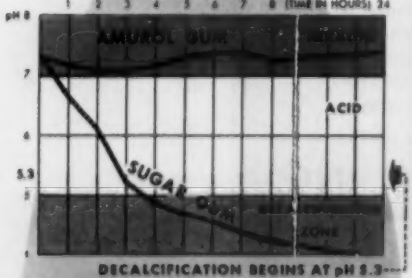

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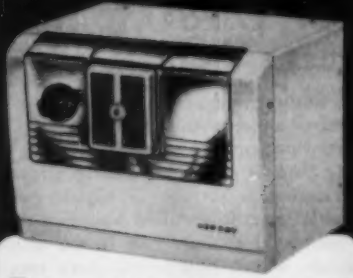

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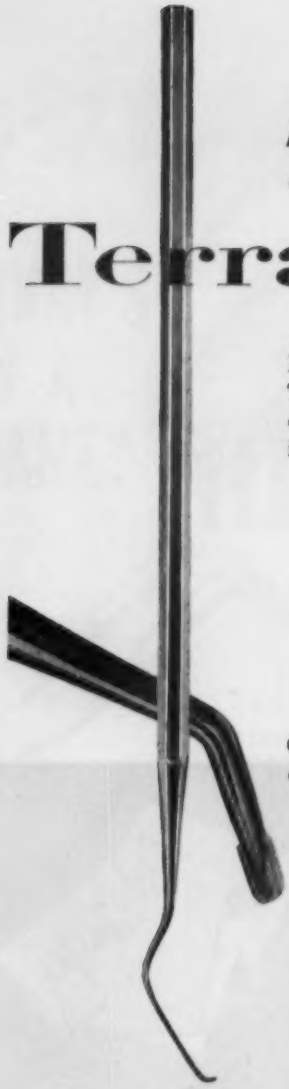

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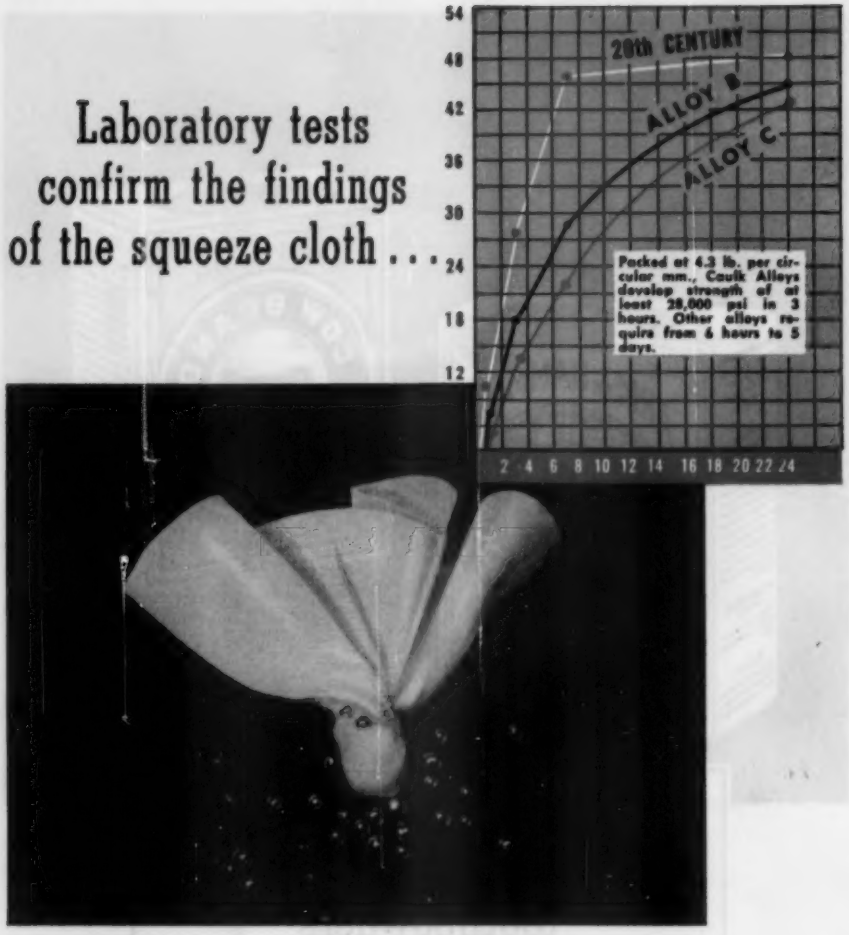
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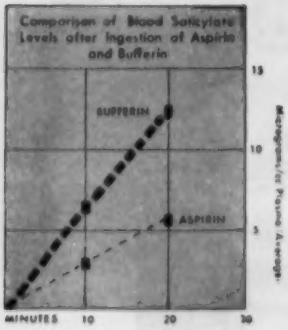

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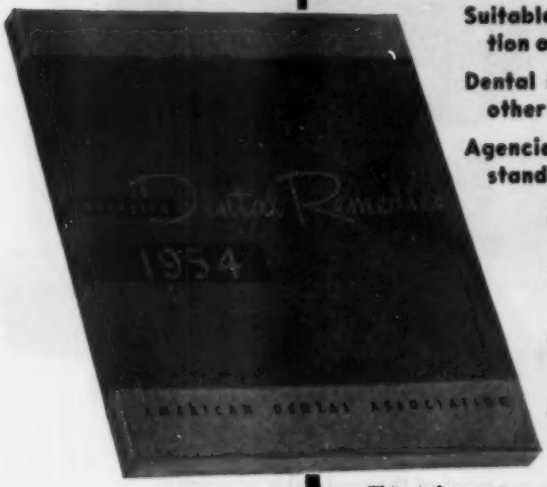

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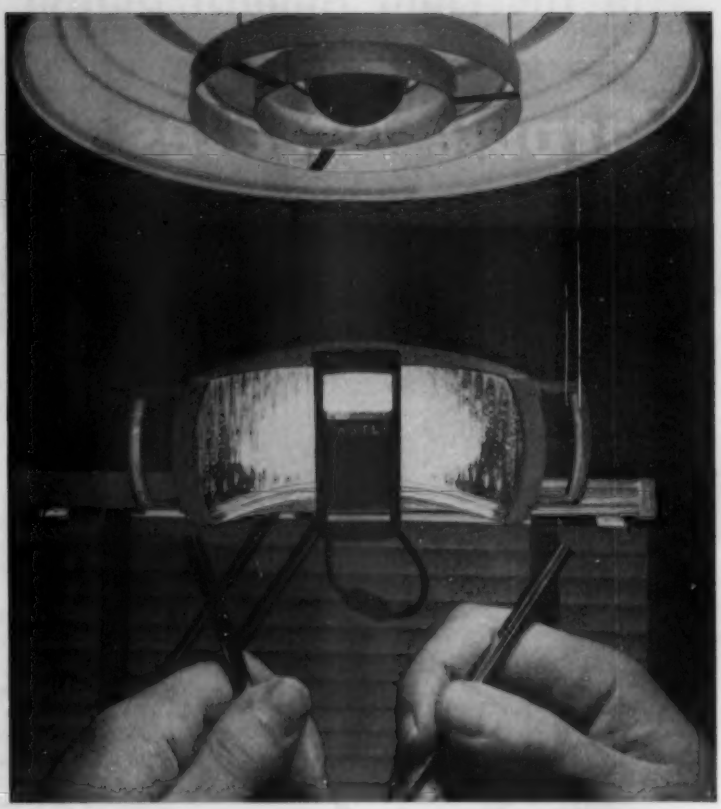

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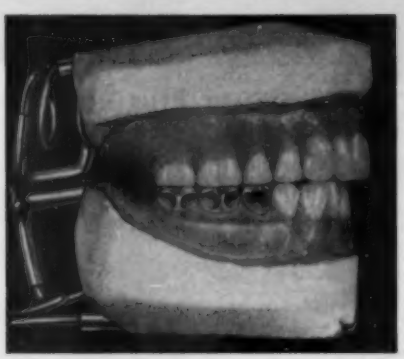

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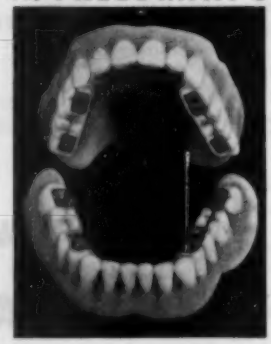

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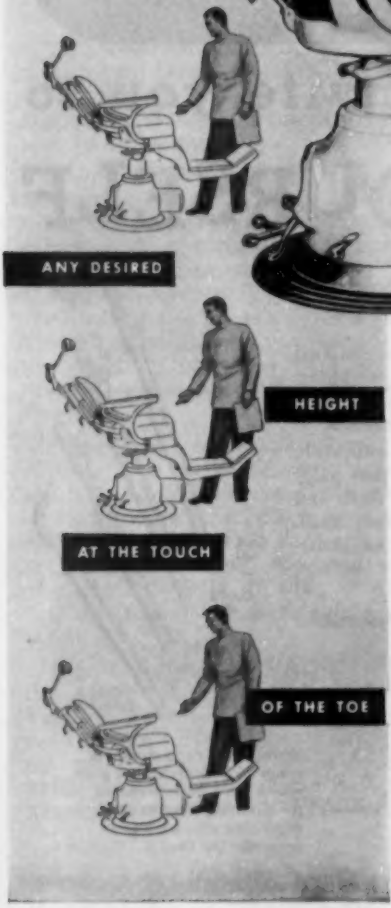

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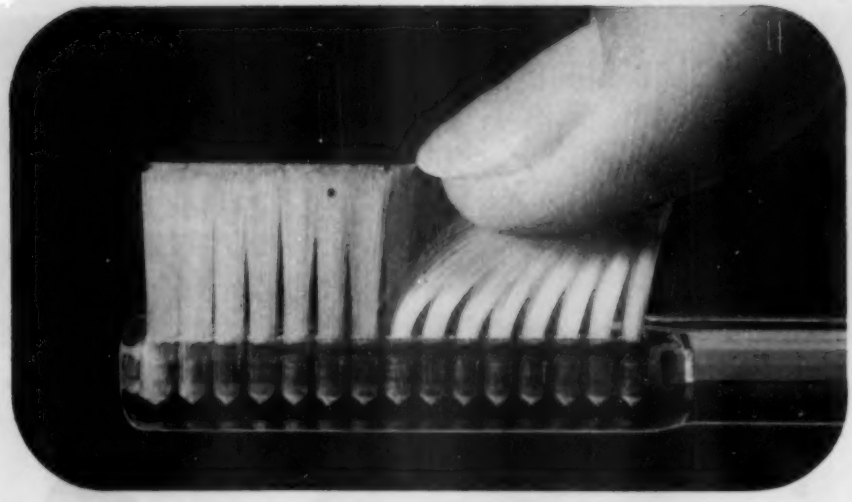
A modern Ritter Motor Chair makes your professional day easier. Smoothly, quietly, you raise or lower patients to the exact operating level best suited to your technique. A touch of the toe on a conveniently located pedal and a motor driven hydraulic base does all the work. No pumping . . . no straining to accommodate yourself to your patient. Consider that the Ritter Motor Chair automatically accommodates 90% of adult patients by a pre-set "standard position" plus adjustment of headrest assembly. This modern chair provides the advantages of adjustable arm rests, a Ritter Compensating Back, all of which are designed to give comfortable, flexible support to patients in all positions.

With a modern Ritter Motor Chair, you can treat more patients in less time with a minimum of effort. Ask your Ritter dealer for a demonstration now, or write to the Ritter Company, Inc., Ritter Park, Rochester 3, New York.

Ritter



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Professional men generally agree that, regardless of the dentifrice used, a toothbrush is the most important factor in maintaining good oral hygiene.

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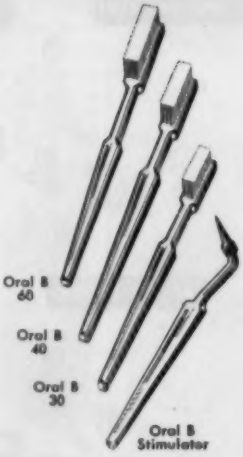
If you wish a complimentary brush, please mail a request on your professional letterhead.



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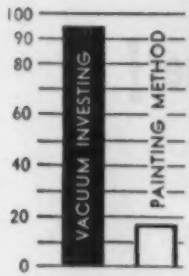
Vacuum investing proved definitely superior



95 to 17 nodule-free castings out of a possible 100 was the score in favor of Vacuum Investing over Painting as reported by scientists at the National Bureau of Standards in their recent report to the profession covering a study of commercial vacuum investors.*

This clear-cut decision puts into meaningful terms and fully corroborates the advantages found by the thousands of users in the profession and in its schools.

It more than substantiates the Bureau's findings as early as 1928† that vacuum mixing is exceptionally effective in eliminating air bubbles from the investment mix. Present equipment not only mixes in a vacuum but also invests in a vacuum. The art of painting is now succeeded by scientific investing with an increased efficiency of more than fivefold.

Whereas all three commercial investors used in the Bureau's tests showed the vacuum investing method to produce a much higher percentage of nodule-free castings than the painting method, no comparison of relative merits of the three investors from other standpoints was made.

Fig. 1 shows the VAC-U-SPAT, the only water aspirator type of Vacuum Investor used in the Bureau's tests. Fig. 2 shows the newest all-electric type utilizing the same VAC-U-SPAT as in Fig. 1, and known as the VAC-U-VESTOR.

*Jour. A.D.A. 46, 2, (Feb.) 1953, (pp 197-198).

†B. of S. Jour. Res. 1, 6, Dec. 1928, pp 934.

The Whip-Mix VAC-U-SPAT has been warmly accepted by the profession as the most practical modern means for investing, and has shown itself simple to use, easy to clean, well engineered and reasonably priced at $67.50. It is now used in leading Dental Schools and in a number of them is on the required list.

Fig. 1

Fig. 2

To help you secure the advantages of the VAC-U-SPAT promptly, the Whip-Mix Corporation is supplying reprints of the Bureau's article, their own interesting dissertation on vacuum investing, and also offering the VAC-U-SPAT for 30-day free trial. Just indicate your desires in the coupon below.

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it's mobile—
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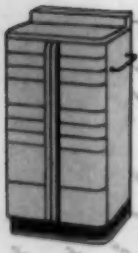

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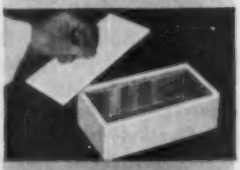

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